EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-01

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	Applications of Climate Change

Contractor	Specify Section and paragraph of Contract SOW
TETRA TECH, INC.	2g

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
09/30/2012 To 09/29/2014		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

Contractor WP Dated:	Cost/Fee:	LOE:
Cumulative Approved:	Cost/Fee:	LOE:

Work Assignment Manager Name: Britta Bierwagen (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8613 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) 10/18/13 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

PERFORMANCE WORK STATEMENT
WA 1-01

TITLE: National Framework and Regional Applications of Climate Change Vulnerability Assessment for Monitoring in Rivers and Streams

Task Order Manager (WAM)	**Alternate Task Order Manager (AWAM)**
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PERIOD OF PERFORMANCE: October 18, 2013 through September 29, 2014

EPA GLOBAL CHANGE RESEARCH PROGRAM

The EPA Office of Research and Development's Global Change Impacts and Adaptation (GCIA) staff within the Air, Climate and Energy (ACE) National Program assesses the potential vulnerability[1] to climate change (and other global change stressors such as land-use change) of EPA's ecosystem, water, human health and air protection efforts at the federal, regional, state, municipal, and tribal levels, as well as adaptation options to build resilience in the face of these vulnerabilities. We carry out interdisciplinary syntheses across newly emerging scientific findings to identify potential impacts and characterize and communicate the uncertainty in the science to provide adaptation[2] support for decision makers and managers. Vulnerability and adaptation assessment activities in the GCIA aquatic ecosystems focus area support EPA's mission and responsibilities as defined by the Clean Water Act (CWA), and are designed to build the capacity of EPA program and regional offices, water and wetland managers, and other decision-makers to assess and respond to global change impacts on aquatic ecosystem processes and services.

BACKGROUND

The GCIA has worked with EPA's Office of Water, the Regions and states to assess the impact of climate change on bioassessment programs. This work has involved determining the sensitivity of bioindicators to climate change[3] and working more extensively with four states to examine historical trends in benthic macroinvertebrate data (http://www.epa.gov/ncea/global/regional_shops.htm). These efforts led to a more recent project with the New England states, New York, and EPA Region 1 to create the analytical

[1] Vulnerability is defined as the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. It is a function of the sensitivity of a particular system to climate changes, its exposure to those changes, and its capacity to adapt to those changes.

[2] Adaptation refers to adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities.

[3] U.S. EPA. Climate Change Effects on Stream and River Biological Indicators: A Preliminary Analysis (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-07/085F, 2008.

foundation for a climate change monitoring network capable of detecting impacts in streams. Workshops, webinars, and other presentations have led to subsequent interest by other regions and programs to conduct similar vulnerability assessments that support the development of monitoring networks to detect climate change-related effects in rivers and streams. WA0-01 made great strides with Regions 3 and 4 in terms of partner engagement, classification analyses, and vulnerability assessments. These new tasks build on the results of WA0-01.

PURPOSE OF THIS TASK ORDER

The purpose of this task order is to provide support to EPA to conduct vulnerability assessments at multiple scales that serve as the analytical foundation of monitoring networks capable of detecting climate change-related effects in rivers and streams. Specifically, deliverables from this task order will inform a national framework and support efforts in Regions 3 and 4. This task order will also continue to advance analytical work on the types of benthic macroinvertebrate indicators that may respond most specifically to changes in the aquatic ecosystem due to climate change, through investigations of species traits. This task order may also extend the traits work to fish, if suitable datasets are available in the regions of interest.

DESCRIPTION OF TASKS

TASK 1: **Establish Communication and Develop a QAPP**

SubTask 1.1. Establish Communication with the WAM and Develop a Regular Reporting Schedule

The Contractor shall contact the WAM and schedule a kickoff call. In collaboration with the WAM, the Contractor shall also establish a schedule for regular progress reports (e.g. one phone call per month for one hour), project meetings, and other communications throughout the period of performance of this Task Order.

Task 1.1 Deliverable 1.1.A: Brief, written progress reports as email to the WAM. Due monthly or upon request by the WAM for the duration of this Task Order.

Task 1.1 Deliverable 1.1.B: Project meetings and other communications, such as conference calls, as needed. Due upon request by the WAM for the duration of this Task Order.

SubTask 1.2. Review QAPP and update as needed

All work conducted under this Task Order shall be performed pursuant to the EPA-approved Quality Assurance Project Plan (QAPP) from WA 0-01. The contractor shall review this QAPP and update it as needed if methods or analyses approaches have changed under this Task Order. If updates are needed, then a revised QAPP shall be submitted for review and approval by the WAM and the EPA QA Officer 30 days after Task Order award. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this Task Order relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this Task Order relevant to geospatial data will reference *Guidance for Quality Assurance Project Plans for Geospatial Data* (EPA QA/G-5G). Elements from these sources will be used to derive a single QAPP for this Task Order.

All electronic deliverables (i.e., computer files) shall be submitted in a format acceptable to EPA.

The contractor shall not incur billable costs for QA related work until receiving IN WRITING from the EPA Task Order Manager that EPA has approved the QAPP.

Task 1.2 Deliverable 1.2.A: Updated QAPP (if necessary) submitted to the WAM for review 30 days after WA award.

Task 1.2 Deliverable 1.2.B: A revised QAPP addressing WAM's and QA officer's comments on the QAPP due one (1) week after receiving comments.

TASK 2: Theoretical framework for national vulnerability assessment of rivers and streams to support monitoring

A theoretical framework is needed to describe the type of information necessary for conducting a climate change vulnerability assessment at different spatial scales for rivers and streams. The framework shall attempt to answer several questions:

- What types of climate change-related vulnerabilities are important for rivers and streams (e.g., changes in low flows/warmer temperatures, timing of winter/spring runoff, peak flows, etc.)?
- What are the ideal data that describe exposure, sensitivity, and adaptive capacity related to each of the vulnerabilities identified (including for present conditions and future conditions, and spatial and temporal resolution)?
- How is a national framework different from a regional approach (e.g., in terms of stream classifications using ecoregions or other available classification schemes, spatial and temporal resolution of sampling, etc.)
- What data are available for a national vs. regional approach?
- Once vulnerability strata are created, how can data from other monitoring efforts be incorporated into analyses to detect climate change-related trends in rivers and streams (using both biological and chemical data)?

WA0-01 made substantial progress toward answering these questions and creating such a framework. This task shall integrate results from analyses using WSA and NARS datasets to further explore regional differences and issues addressing transferability of results and insights to other regions of the US.

SubTask 2.1. Develop Analysis Plan

Develop an analysis plan and describe the statistical approaches for national and regional monitoring efforts, as well as incorporation of data from other monitoring efforts. Present analysis plan to relevant EPA experts and stakeholders, e.g., ORD EMAP, OW/OWOW, potentially Regions, through a conference call or webinar. A presentation of this effort also shall be made to a wider national audience, such as during the annual meeting of the Society for Freshwater Science.

Task 2.1 Deliverable 2.1.A: Draft analysis plan incorporating WA0-01 Deliverables 2.1.C (memo describing vulnerabilities) and 2.2.A (data sources) due 8 weeks after WA initiation.

Task 2.1 Deliverable 2.1.B: Presentation to relevant EPA experts and stakeholders to gather input and feedback on analysis plan due 3 weeks after receiving comments from WAM on Deliverable 2.1.A.

Task 2.1 Deliverable 2.1.C: Final analysis plan incorporating feedback from Deliverable 2.1.B due 2 weeks after presentation.

Task 2.1 Deliverable 2.1.D: Presentation at national conference on analysis plan and theoretical approach.

SubTask 2.2. Journal article describing theoretical approach

This journal article shall discuss the relevant vulnerabilities, data sources, assessment approaches, and analysis plan identified in WA0-01 Task 2 and synthesized in Deliverable 2.1.C and further discuss comparative vulnerabilities of stream ecosystems, issues of scale in terms of conducting vulnerability assessments nationally, regionally, or sub-regionally, and transferability of approaches applied to the East Coast to other parts of the U.S. This article shall be targeted at a journal that publishes shorter, theoretical pieces relatively quickly, such as Environmental Research Letters.

Task 2.2 Deliverable 2.2.A: Journal article outline and proposed journals due 2 weeks after Deliverable 2.1.C.

Task 2.2 Deliverable 2.2.B: Draft journal article based on revisions of outline as discussed with WAM due 8 weeks after receiving comments on Deliverable 2.2.A.

Task 2.2 Deliverable 2.2.C: Internal review draft of journal article due 2 weeks after receiving comments from WAM on Deliverable 2.2.B.

Task 2.2 Deliverable 2.2.D: Draft of journal article for submission to EPA clearance and journal due 4 weeks after receiving internal review draft comments.

TASK 3: Analytical support for regional networks in EPA Regions 3 and 4

EPA Regions 3 and 4 are interested in developing climate change monitoring networks for their rivers and streams, similar to an effort conducted with EPA Region 1 states and New York.

SubTask 3.1. Continue Interactions with Regional Steering Committees through calls and webinars

Regional steering committees (RSC) set up under WA0-01 for each region will continue in order to maintain communications and receive input on tasks in WA1-01. The Contractor shall coordinate calls and webinars with RSCs.

Task 3.1 Deliverable 3.1: Conduct up to 5 webinars/conference calls with each RSC to get input on relevant tasks and deliverables over the course of the WA.

SubTask 3.2. Vulnerability Analyses

Complete classification analyses and vulnerability assessments for Regions, assessment of specific candidate long-term references sites, and produce regional maps of vulnerability strata and potential sampling locations. The vulnerability assessments shall make use of the classification results from WA0-01 and the scenario development done with input from the RSCs. Use of predicted stream temperatures may be needed, and could be validated using Maryland sentinel sites data on continuous temperature. These analyses could inform stream temperature modeling across the broader region of analysis for one aspect of the vulnerability assessment.

Task 3.2 Deliverable 3.2.A: Draft analyses and vulnerability assessment results, along with draft maps and analysis of candidate long-term monitoring sites, due 12 weeks after WA initiation.

Task 3.2 Deliverable 3.2.B: Presentations of draft results, vulnerability assessments, and maps to respective RSC due within 2 weeks after receiving comments on Deliverable 3.2.A from WAM.

Task 3.2 Deliverable 3.2.C: Final vulnerability assessments, along with maps due 4 weeks after Deliverable 3.2.B.

SubTask 3.3. Finalize Temperature and Flow Protocols Report

The Contractor shall respond to external peer review comments for the temperature and flow protocols report.

Task 3.3 Deliverable 3.3: Responses to external peer review comments in a separate document and final report due 4 weeks after receipt of comments from WAM.

SubTask 3.4. Assist with Macroinvertebrate and Habitat Sampling Protocols Memo

Region 3 is taking the lead on describing R3 state sampling protocols, laboratory analyses and other relevant information for states to implement the monitoring plan. The Contractor shall assist with collecting comments from RSC members and revising the memo to make it more generally applicable to wider regional sampling.

Task 3.4 Deliverable 3.4: Revised sampling protocols memo due 2 weeks after receipt of comments from WAM.

SubTask 3.5. Provide Data Files

The Contractor shall provide to the WAM all modeling output generated in this Task Order as digital computer files. The data shall be provided in a digital format specified by the WAM on an external hard drive with sufficient storage memory for storing all necessary files. The Contractor

shall organize model output files in a directory and using a file-naming convention agreed upon by the WAM.

> *Task 3.5 Deliverable 3.5.*: Transmit all modeling output data as digital computer files in a file directory and using a file-naming convention specified by the WAM. Due three (3) weeks after approval of Deliverable 3.2.C.

TASK 4: **Combine temperature and hydrologic-preference traits for Northeast and Mid-Atlantic/Appalachians by vulnerability category**

Temperature and hydrologic-preference modeling has been conducted using benthic macroinvertebrate data from New York and New England states. However, these datasets have not been combined to examine which assemblages of species may respond to specific vulnerability categories, such as low flows with warm water temperatures. Data from Mid-Atlantic and Appalachian states are also applicable, though some additional temperature and hydrologic-preference modeling may be needed in order to combine with the Northeast.

This task shall build on recent research to develop more specific climate change indicators for classes/vulnerability categories in these regions. Possible approaches to explore may include niche modeling or other multivariate methods exploring species distributions and relationships to substrates, feeding types, or other aspects of habitat fidelity. This task shall also incorporate information relevant to thermal and flow indicators from recent NARS assessments. This task may also incorporate selected data on fish thermal and hydrologic preferences, if a suitable dataset is available (even for a subset of states), potentially through Region1 or other agencies. Including fish as part of the analysis may facilitate analyses of comparisons with the relative vulnerability of benthic macroinvertebrates and the spatial congruence of vulnerable habitats. Methods and analytical approaches shall be developed with expert input. The Contractor shall maintain communications with selected experts, who will review proposed methods and analyses for developing these novel, trait-based indicators and potential comparisons with fish data through conference calls, webinars, or written materials.

Subtask 4.1. Schedule expert steering committee (ESC) calls

The Contractor shall contact the list of experts finalized in WA0-01 to schedule conference calls and webinars. Call topics are likely to include: (1) expert introductions and recent research; (2) data analysis on hydrologic traits done in Northeast using state and EPA datasets; (3) draft analysis plan for developing an indicator of a climate-sensitive community based on a suite of temperature and hydrologic traits; (4) presentation of results and comparison to other recent research; and (5) discussion of publication.

> *Task 4.1 Deliverable 4.1*: Schedule to conduct initial conference call and subsequent webinars or calls according to availability of WAM and ESC members and deliverables to be presented 2 weeks after WA initiation.

Subtask 4.2. Develop analysis plan

The Contractor shall review recent literature on species traits analyses, particularly related to climate change impacts detection, and documents suggested by the ESC. The Contractor shall then develop an analysis plan for the stream biological data in the Northeast, based upon this review.

Task 4.2 Deliverable 4.2.A: Draft analysis plan based on literature review and ESC input due 4 weeks after first call with ESC (Deliverable 4.1).

Task 4.2 Deliverable 4.2.B: Final analysis plan revised based on input from WAM and ESC 2 weeks after call/webinar with ESC discussing the draft analysis plan (Deliverable 4.2.A).

Subtask 4.3. Conduct analysis

The Contractor shall implement the analysis plan delivered in Subtask 4.2. Results shall also be presented to the ESC as part of Deliverable 4.1.B.

Task 4.3 Deliverable 4.3.A: Draft results based on analysis plan in Deliverable 4.2.B due 16 weeks after approval of Deliverable 4.2.B.

Task 4.3 Deliverable 4.3.B: Final results revised based on input from WAM and ESC 6 weeks after call/webinar with ESC discussing the draft results (Deliverable 4.3.A).

Subtask 4.4. Input Data into Freshwater Species Traits Database

The Contractor shall prepare all relevant data files to be uploaded into the online Freshwater Species Traits Database (www.epa.gov/ncea/global/traits).

Task 4.4 Deliverable 4.4.: Upload relevant data files into online Freshwater Species Traits Database due 2 weeks after Deliverable 4.3.B.

Task 5: EPA Report on Vulnerability Assessment Methodologies and Monitoring

The Contractor shall develop an EPA report documenting regional (covering portions of EPA Regions 1, 2, 3, and 4) vulnerability assessments and the approach for a national vulnerability assessment to support river and stream monitoring of climate change-related effects. The Contractor has the option of producing either one comprehensive report covering the Northeastern analyses and Tasks 2 and 3 of this WA and WA0-01, or two smaller reports. The final decision shall be made in consultation with the EPA WAM.

Subtask 5.1. Prepare EPA report (one comprehensive or two smaller)

The Contractor shall prepare the EPA report according to NCEA report guidelines (provided by WAM).

Task 5.1 Deliverable 5.1.A: Internal review draft(s) of report due 4 weeks after approval Deliverable 3.2.C.

Task 5.1 Deliverable 5.1.B: Responses to internal review comments (in a separate document) and external review draft(s) of report(s) due 4 weeks after receipt of comments.

Task 6: **Journal Articles**

The Contractor shall assist with revisions to a submitted manuscript and develop drafts for three additional manuscripts and an outline for one manuscript that describe the results from the analytical work above. The Contractor shall assist with responding to external review comments on the analytical framework for a Northeastern monitoring network manuscript. The new manuscripts include (1) revising a draft manuscript on vulnerability assessment work in the Northeast to include additional analyses covering Regions 2-4; (2) preparing a manuscript focused predominantly on classification analyses; and (3) describing analyses and results of the combined trait-based indicators using data from the Northeast. These manuscripts shall be ready for internal review. The outline for another paper may result from the vulnerability manuscript and perhaps cover more technical issues.

SubTask 6.1. Assist with revisions of submitted manuscript

The Contractor shall assist with responding to external review comments on the manuscript of the Northeastern analytical framework for monitoring.

Task 6.1 Deliverable 6.1.A: Call to discuss addressing external review comments 1 week after receipt of comments.

Task 6.1 Deliverable 6.1.B: Revised analytical framework manuscript as final submission to journal due 6 weeks after Deliverable 6.1.A.

SubTask 6.2. Prepare vulnerability assessment manuscript

The Contractor shall revise the draft vulnerability assessment manuscript to incorporate relevant methods and results from Task 3.

Task 6.2 Deliverable 6.2.A: Draft vulnerability assessment manuscript in suitable journal format for internal review due 2 weeks after Deliverable 5.1.A.

Task 6.2 Deliverable 6.2.B: Call to discuss addressing internal review comments 1 week after receipt of comments.

Task 6.2 Deliverable 6.2.C: Revised vulnerability assessment manuscript for EPA clearance and initial journal submission due 4 weeks after Deliverable 6.2.B.

SubTask 6.3. Prepare classification manuscript

The Contractor shall prepare an outline and draft of a manuscript based on the classification analyses for Task 3 (WA0-01). The Contractor shall present the results of the classification at a national meeting, such as the National Water Quality Monitoring Council conference.

Task 6.3 Deliverable 6.3.A: Proposed outline for a manuscript describing the classification analyses due 2 weeks after WA initiation.

Task 6.3 Deliverable 6.3.B: Draft manuscript 8 weeks after receipt of WAM comments on Deliverable 6.3.A.

Task 6.3 Deliverable 6.3.C: Revised manuscript ready for internal EPA review due 3 weeks after receipt of comments on Deliverable 6.3.B.

Task 6.3 Deliverable 6.3.D: Call to discuss internal review comments within 1 week of receipt of comments.

Task 6.3 Deliverable 6.3.E: Revised manuscript ready for submissions to EPA clearance and journal 4 weeks after Deliverable 6.3.D.

Task 6.3 Deliverable 6.3.F: Presentation on classification results at national meeting, such as National Water Quality Monitoring Council.

SubTask 6.4. Prepare outline on traits-based analyses

The Contractor shall prepare an outline based on the community traits analyses in Task 4.

Task 6.4 Deliverable 6.4.A: Proposed outline for a manuscript describing the traits-based analyses due 2 weeks after Deliverable 4.3.B.

Task 6.4 Deliverable 6.4.B: Final revised outline 1 week after receipt of WAM comments on Deliverable 6.4.A.

SubTask 6.5. Prepare outline for additional manuscript covering technical aspects of vulnerability assessments

The Contractor shall prepare an outline and draft of a manuscript based on the vulnerability analyses for Task 3.

Task 6.5 Deliverable 6.5.A: Proposed outline for a manuscript describing the technical aspects of vulnerability assessment due 2 weeks after Deliverable 5.1.A.

Task 6.5 Deliverable 6.5.B: Final revised outline 1 week after receipt of WAM comments on Deliverable 6.5.A.

SCHEDULE OF BENCHMARKS & DELIVERABLES:

Task No.	SubTask No.	DELIVERABLE	Incremental Schedule
1	1.1	**1.1.A.** Brief, written progress reports.	Due monthly or upon request by the WAM for the duration of this Task Order.
1	1.1	**1.1.B.** Project meetings and other communications, such as conference calls, as needed.	Due upon request by the WAM for the duration of this Task Order.
1	1.2	**1.2.A.** Updated QAPP (if necessary)	Due 30 days after WA award.
1	1.2	**1.2.B.** Revised QAPP	Due 1 week after WAM comments
2	2.1	**2.1.A.** Draft analysis plan	Due 8 weeks after WA award
2	2.1	**2.1.B.** Presentation	Due 3 weeks after receiving comments from WAM on 2.1.A.
2	2.1	**2.1.C.** Final analysis plan	Due 2 weeks after Deliverable 2.1.B.
2	2.2	**2.2.A.** Outline	Due 2 weeks after approval of Deliverable 2.1.C.
2	2.2	**2.2.B.** Draft manuscript	Due 8 weeks after approval of Deliverable 2.2.B.
2	2.2	**2.2.C.** Internal review draft	Due 2 weeks after WAM comments on Deliverable 2.2.B.
2	2.2	**2.2.D.** Article to submit	Due 4 weeks after Deliverable 2.2.C.
3	3.1	**3.1.** RSC interactions	Throughout WA
3	3.2	**3.2.A.** Draft results	Due 12 weeks after WA initiation
3	3.2	**3.2.B.** Presentation of results	Due 2 weeks after Deliverable 3.2.A
3	3.2	**3.2.C.** Final analyses	Due 4 weeks after Deliverable 3.2.B
3	3.3	**3.3.** Temp and flow report revisions	Due 4 weeks after receipt of comments
3	3.4	**3.4.** Revised sampling protocols memo	Due 2 weeks after receipt of comments from WAM
3	3.5	**3.5.** Transmit output data	Due 3 weeks after Deliverable 3.2.C.
4	4.1	**4.1.** Initial ESC call	Due 2 weeks after WA initiation

4	**4.2**	**4.2.A.** Draft analysis plan for traits data	Due 4 weeks after Deliverable 4.1.
4	**4.2**	**4.2.B.** Final analysis plan	Due 2 weeks after call/webinar with ESC
4	**4.3**	**4.3.A.** Draft results	Due 16 weeks after Deliverable 4.2.B.
4	**4.3**	**4.3.B.** Final results	Due 6 weeks after call/webinar with ESC
4	**4.4**	**4.4.** Upload data to Freshwater Species Traits Database	Due 2 weeks after Deliverable 4.3.B.
5	**5.1**	**5.1.A.** Internal review draft report	Due 4 weeks after Deliverable 3.2.C.
5	**5.1**	**5.1.B.** Response to comments	Due 4 weeks after receipt of comments from WAM
6	**6.1**	**6.1.A.** Address external comments on analytical framework manuscript	Due 1 weeks after receipt of external review comments
6	**6.1**	**6.1.B.** Final revised manuscript	Due 6 weeks after Deliverable 6.1.A.
6	**6.2**	**6.2.A.** Draft vulnerability assessment manuscript for internal review	Due 2 weeks after Deliverable 5.1.A.
6	**6.2**	**6.2.B.** Discuss internal review comments	Due 1 week after receipt of comments
6	**6.2**	**6.2.C.** Revised vulnerability assessment manuscript for EPA clearance and journal submission	Due 4 weeks after Deliverable 6.2.B.
6	**6.3**	**6.3.A.** Outline for classification manuscript	Due 2 weeks after WA initiation
6	**6.3**	**6.3.B.** Draft manuscript	Due 8 weeks after Deliverable 6.3.A.
6	**6.3**	**6.3.C.** Revised manuscript for internal review	Due 3 weeks after receipt of comments on Deliverable 6.3.B
6	**6.3**	**6.3.D.** Discuss internal review comments	Due 1 week after receipt of comments
6	**6.3**	**6.3.E.** Revised manuscript for EPA clearance	Due 4 weeks after approval of Deliverable 6.3.D
6	**6.4**	**6.4.A.** Proposed outline on traits analyses	Due 2 weeks after approval of Deliverable 4.3.B.
6	**6.4**	**6.4.B.** Final outline	Due 1 week after comments on Deliverable 6.4.A
6	**6.5**	**6.5.A.** Outline for technical manuscript	Due 2 weeks after Deliverable 5.1.A
6	**6.5**	**6.5.B.** Final outline	Due 1 week after receipt of WAM comments on Deliverable 6.5.A.

REPORTING

All documentation and reporting under this Task Order shall be in compliance with contract requirements. See contract clause F.2, F.3, and J.2 "List of Attachments, Number 2 - Reports of Work".

Additional requirements specific to this Task Order are as follows:

Electronic deliverables must be in an original file format that can be supported by EPA after the end of the Period of Performance of the Task Order. The standard office software at EPA is MS Office. The standard GIS software at EPA is ESRI ArcGIS.

TRAVEL

Travel is required under this TO.

CONTRACTOR IDENTIFICATION

Contractor personnel shall always identify themselves as Contractor employees by name and organization and physically display that information through an identification badge. Contractor personnel are prohibited from acting as the Agency's official representative.

The Contractor shall refer any questions relating to the interpretation of EPA policy, guidance, or regulation to the Task Order Manager.

REFERENCES

U.S. EPA. 2011. Implications of Climate Change for State Bioassessment Programs and Approaches to Account for Effects (External Review Draft). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-11/036A.

Voeroesmarty C. J.; McIntyre P. B.; Gessner M. O.; et al., 2010. Global threats to human water security and river biodiversity. Nature 467 (7315): 555-561.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-01

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	Applications of Climate Change

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

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Period of Performance: From 09/30/2013 To 09/29/2014

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Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee	LOE
Contract Period: 09/30/2012 To 09/29/2014	$0.00	0
This Action:	$129,733.00	1,070
Total:	$129,733.00	1,070

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 10/29/2013	Cost/Fee:	$129,733.00	LOE: 1,070
Cumulative Approved:	Cost/Fee:	$129,733.00	LOE: 1,070

Work Assignment Manager Name: Britta Bierwagen	(Signature)	(Date)	Branch/Mail Code: Phone Number: 703-347-8613 FAX Number:
Project Officer Name: Sharon Boyde	(Signature)	(Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name	(Signature)	(Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley	(Signature)	11/06/13 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

EPA

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Work Assignment

Work Assignment Number: 1-01

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	Climate Change Vulnerability

Contractor	Specify Section and paragraph of Contract SOW
TETRA TECH, INC.	2a

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:
Request for Revised WP and Cost Proposal for WA 1-01. Work under WA 1-01 has been proceeding quickly, and has made use of opportunities to collaborate and incorporate data. Therefore, the timing of work on specific tasks has shifted efforts. Additional hours needed: 160. - Task 1: 10 hours - Task 2: 20 hours Task 3: 30 hours - Task 4: 20 hours - Task 5: 30 hours - Task 6: 50 hours

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 09/30/2012 To 09/29/2014 — Cost/Fee: — LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: — Cost/Fee: — LOE:

Cumulative Approved: — Cost/Fee: — LOE:

Work Assignment Manager Name: Britta Bierwagen (Signature) (Date)		Branch/Mail Code: Phone Number: 703-347-8613 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)		Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)		Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) (Date)		Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-01

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014	
	Base Option Period Number 1	

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☒ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

Version	LOE	CPFF
Original	1,070	$129,733
Amd. 1	160	$0
Total	1,230	$129,733

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 09/30/2012 To 09/29/2014	$129,733.00	1070
This Action:	$0.00	160
Total:	$129,733.00	1,230

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated: 05/09/2014	$0.00	160
Cumulative Approved:	$129,733.00	1,230

Work Assignment Manager Name: Britta Bierwagen (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8613 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-01

☐ Other ☒ Amendment Number: 000002

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	Climate Change Vulnerability

Contractor	Specify Section and paragraph of Contract SOW
TETRA TECH, INC.	2c

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:
Please provide a WP and cost proposal NLT 07/10/2014

☐ Superfund – Accounting and Appropriations Data – ☒ Non-Superfund

SFO (Max 2): ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
09/30/2012 To 09/29/2014		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

Contractor WP Dated:	Cost/Fee:	LOE:
Cumulative Approved:	Cost/Fee:	LOE:

Work Assignment Manager Name: Britta Bierwagen (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8613 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) 06/25/14 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

PERFORMANCE WORK STATEMENT
WA1-01
Amendment 2

TITLE: National Framework and Regional Applications of Climate Change Vulnerability Assessment for Monitoring in Rivers and Streams

Task Order Manager (WAM)	**Alternate Task Order Manager (AWAM)**
Name: Britta Bierwagen	Name: Susan Julius
Office: ORD/NCEA/GCRP 1200 Pennsylvania Ave., NW (MC 8601P) Washington, DC 20460	Office: ORD/NCEA/GCRP 1200 Pennsylvania Ave., NW (MC 8601P) Washington, DC 20460
Phone: 703-347-8613	Phone: 703-347-8619
Fax: 703-347-8694	Fax: 703-347-8694
Email: Bierwagen.Britta@epa.gov	Email: Julius.Susan@epa.gov

PERIOD OF PERFORMANCE: Award of WA through September 29, 2014

EPA GLOBAL CHANGE RESEARCH PROGRAM

The EPA Office of Research and Development's Global Change Impacts and Adaptation (GCIA) staff within the Air, Climate and Energy (ACE) National Program assesses the potential vulnerability[1] to climate change (and other global change stressors such as land-use change) of EPA's ecosystem, water, human health and air protection efforts at the federal, regional, state, municipal, and tribal levels, as well as adaptation options to build resilience in the face of these vulnerabilities. We carry out interdisciplinary syntheses across newly emerging scientific findings to identify potential impacts and characterize and communicate the uncertainty in the science to provide adaptation[2] support for decision makers and managers. Vulnerability and adaptation assessment activities in the GCIA aquatic ecosystems focus area support EPA's mission and responsibilities as defined by the Clean Water Act (CWA), and are designed to build the capacity of EPA program and regional offices, water and wetland managers, and other decision-makers to assess and respond to global change impacts on aquatic ecosystem processes and services.

BACKGROUND

The GCIA has worked with EPA's Office of Water, the Regions and states to assess the impact of climate change on bioassessment programs. This work has involved determining the sensitivity of bioindicators to climate change[3] and working more extensively with four states to examine historical trends in benthic macroinvertebrate data

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[1] Vulnerability is defined as the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. It is a function of the sensitivity of a particular system to climate changes, its exposure to those changes, and its capacity to adapt to those changes.

[2] Adaptation refers to adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities.

[3] U.S. EPA. Climate Change Effects on Stream and River Biological Indicators: A Preliminary Analysis (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-07/085F, 2008.

(http://www.epa.gov/ncea/global/regional_shops.htm). These efforts led to a more recent project with states in EPA Regions 1-4 to create the analytical foundation for a climate change monitoring network capable of detecting impacts in streams. Workshops, webinars, and other presentations have led to subsequent interest by other regions and programs to conduct similar vulnerability assessments that support the development of monitoring networks to detect climate change-related effects in rivers and streams. WA1-01 made great strides with Regions 3 and 4 in terms of partner engagement, classification analyses, and vulnerability assessments. This amendment builds on the current results of WA1-01 and add tasks to involve Regions 5 and 7, their states and tribes, as well as continue original tasks with additional specifications.

PURPOSE OF THIS TASK ORDER

The purpose of this task order amendment is to provide support to EPA to conduct vulnerability assessments at multiple scales that serve as the analytical foundation of monitoring networks capable of detecting climate change-related effects in rivers and streams. Specifically, deliverables from this task order amendment will inform a national framework and support new efforts in Regions 5 and 7. This task order amendment will also continue to advance analytical work on the types of benthic macroinvertebrate indicators that may respond most specifically to changes in the aquatic ecosystem due to climate change, through investigations of species traits. This task order amendment may also extend the traits work to fish, if suitable datasets are available in the regions of interest.

DESCRIPTION OF TASKS

TASK 1: **Continue communication and revise QAPP as necessary**

SubTask 1.1. Continue Communication Regular Reporting

Project meeting, and other communications shall continue throughout the period of performance of this Task Order.

Task 1.1 Deliverable 1.1.A: Brief, written progress reports as email to the WAM. Due monthly or upon request by the WAM for the duration of this Task Order.

Task 1.1 Deliverable 1.1.B: Project meetings and other communications, such as conference calls, as needed. Due upon request by the WAM for the duration of this Task Order.

SubTask 1.2. Review QAPP and update as needed

All work conducted under this amendment shall be performed pursuant to the EPA-approved Quality Assurance Project Plan (QAPP) from WA 1-01. The contractor shall review this QAPP and update it as needed if methods or analyses approaches have changed under this Task Order. If updates are needed, then a revised QAPP shall be submitted for review and approval by the WAM and the EPA QA Officer 30 days after Task Order award. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this Task Order relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this Task Order relevant to geospatial data will reference *Guidance for Quality Assurance Project Plans for Geospatial Data*

(EPA QA/G-5G). Elements from these sources will be used to derive a single QAPP for this Task Order.

All electronic deliverables (i.e., computer files) shall be submitted in a format acceptable to EPA.

The contractor shall not incur billable costs for QA related work until receiving IN WRITING from the EPA Task Order Manager that EPA has approved the QAPP.

Task 1.2 Deliverable 1.2.A: Updated QAPP (if necessary) submitted to the WAM for review 30 days after WA award.

Task 1.2 Deliverable 1.2.B: A revised QAPP addressing WAM's and QA officer's comments on the QAPP due one (1) week after receiving comments.

TASK 2: Vulnerability assessment of rivers and streams to support monitoring

The work from WA0-01 and 1-01 have advanced both the theory and application of vulnerability assessments to support monitoring of climate change effects in streams. This task will now synthesize the conceptual work into an article on advancing the application of vulnerability assessments and finalize analyses of vulnerability for Regions 1-4.

SubTask 2.1. Journal article on advancing the application of vulnerability assessments

This journal article shall discuss:

- Common conceptual models of vulnerability assessments
- Issues that arise when applying these conceptual models to real-world examples
- Data availability for current condition assessments vs. assessments of future condition
- Issues of spatial scale
- Methods to address these issues
- Examples
    - Assessing current vulnerability (e.g., EPA 2011)[4]
    - Scaling indicators, vulnerabilities
    - Qualitative assessments
    - Quantitative assessments
    - Need for data appropriate for goals
    - Differences in outcomes between addressing one specific vulnerability vs. overall vulnerability of system

This article shall be targeted at a journal that publishes shorter, theoretical pieces relatively quickly, such as Environmental Research Letters.

Task 2.1 Deliverable 2.1.A: Journal article outline and proposed journals due 2 weeks after amendment initiation.

[4] U.S. EPA. Aquatic Ecosystems, Water Quality, and Global Change: Challenges of Conducting Multi-Stressor Vulnerability Assessments (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-11/011F, 2011.

Task 2.1 Deliverable 2.1.B: Draft journal article based on revisions of outline as discussed with WAM due 8 weeks after receiving comments on Deliverable 2.1.A.

SubTask 2.2. Journal article on vulnerability assessment of eastern streams

This journal article shall discuss:

- Specific vulnerabilities chosen for analysis
- Data selection to address each vulnerability
- Modeling approach
    - Use of classification
    - Use of biological data
- Modeling probability of change in stream state

Task 2.2 Deliverable 2.2.A: Finalize analyses of vulnerability for East Coast (Regions 1-4), including maps, due 10 weeks after amendment initiation.

Task 2.2 Deliverable 2.2.B: Develop journal article outline and propose candidate journals due 3 weeks after Deliverable 2.2.A.

TASK 3: Analytical support for regional networks

EPA Regions 1-4 are now collecting data. Follow-up is needed to discuss lessons learned and share issues and solutions among the Regions. Additionally, Regions 5 and 7 are interested in developing climate change monitoring networks for their rivers and streams. These Regions pose some new challenges in terms of classification and vulnerabilities.

SubTask 3.1. Continue Interactions with Regional Steering Committees through calls and webinars

Set up webinar with Regional Steering Committees from Regions 1-4 to debrief the sampling season and instrument deployment. The Contractor shall coordinate 1 webinar with RSCs in September when the majority of the sampling has been completed.

Task 3.1 Deliverable 3.1: Conduct a webinar with all RSCs to debrief sampling season and instrument deployment, as well as discuss next steps, due in September 2014.

SubTask 3.2. Analytical support to develop monitoring networks in Regions 5 and 7

Regions 5 and 7, as well as their states and tribes, have expressed interest in establishing regional monitoring networks to detect climate change effects. These regions will likely pose new challenges in terms of stream classification and vulnerability assessment. Initial analyses should focus on using the classification methodology developed for the East Coast using NARS data to assess any overlap with portions of these new Regions. Then analyses shall examine new classes within these Regions. These Regions will likely not have many least-disturbed reference sites. Use of the Biological Condition Gradient (BCG) developed in IL (potentially elsewhere) may be applicable for defining reference sites in other condition classes. Sites may be selected using

a combination of the classification, BCG, and vulnerability assessment based on thermal thresholds and climate velocities, and potentially other factors.

Task 3.2 Deliverable 3.2.A: Draft classification analyses due 6 weeks after amendment initiation.

Task 3.2 Deliverable 3.2.B: Revision of climate velocities and examination of thermal thresholds data due 3 weeks after Deliverable 3.2.A.

Task 3.2 Deliverable 3.2.C: Webinars with Regions 5 and 7 steering committees to discuss goals, analyses and approaches for each Region, initial results due 2 weeks after approval of Deliverables 3.2.A and B by WAM.

SubTask 3.3. Provide Data Files

The Contractor shall provide to the WAM all modeling output generated in this Task Order as digital computer files. The data shall be provided in a digital format specified by the WAM on an external hard drive with sufficient storage memory for storing all necessary files. The Contractor shall organize model output files in a directory and using a file-naming convention agreed upon by the WAM.

Task 3.3 Deliverable 3.3.: Transmit all modeling output data as digital computer files in a file directory and using a file-naming convention specified by the WAM. Due 2 weeks before the end of Option Year 1.

TASK 4: Synthesis of current research on climate-relevant traits and suites of traits

This task shall build on traits work developed under the initial WA1-01 as part of a synthesis of research on climate-relevant traits and suites of traits. Experts in this field shall be selected based on relevant publications and research in this field. These experts shall be contacted to form a steering committee to provide comments on analyses and results developed under WA1-01, and to present their own research to potentially develop a synthesis article.

Subtask 4.1. Schedule expert steering committee (ESC) calls

The Contractor shall develop a list of experts to be reviewed by the WAM and then schedule conference calls and webinars for the selected steering committee. Webinars shall include a presentation of analyses and results of work on traits from WA1-01 and then brief overview presentations of the expert's work. The contractor shall then gauge interest in a synthesis article that describes the needs and benefits of trait-related work, particularly for analyses of climate change effects.

Task 4.1 Deliverable 4.1.A: List of experts due 1 week after amendment initiation.

Task 4.1 Deliverable 4.1.B: Schedule to conduct initial conference call and subsequent webinars or calls according to availability of WAM and ESC members and deliverables to be presented 2 weeks after approval of Deliverable 4.1.A.

Subtask 4.2. Develop outline of synthesis article

Based on ESC input and interest, the Contractor shall develop a draft outline of a synthesis article.

> *Task 4.2 Deliverable 4.2*: Draft outline based on ESC input due 2 weeks after discussing this topic with the ESC (Deliverable 4.1.B).

Task 5: EPA Report Revisions

The Contractor finalize edits to the temperature and flow best practices report and respond to internal review comments on the Regional Monitoring Network report.

SubTask 5.1. Finalize Temperature and Flow Protocols Report

The Contractor shall finalize responses to external peer review comments for the temperature and flow protocols report.

Task 5.1 Deliverable 5.1: Finalize responses to external peer review comments in a separate document and final report due 1 week after amendment initiation.

Subtask 5.2. Respond to internal review comments on Regional Monitoring Networks report

The Contractor shall respond to internal review comments on the Regional Monitoring Networks report in a separate document and revise the report based on review comments.

> *Task 5.2 Deliverable 5.2*: Responses to internal review comments (in a separate document) and external review draft of report due 4 weeks after receipt of comments.

Task 6: Journal Articles

The Contractor shall assist with revisions to a submitted manuscript and assist with the development of another manuscript. The Contractor shall assist with revisions to the analytical framework for a Northeastern monitoring network manuscript. The Contractor shall assist with the development of a manuscript about the stream classification for the East Coast region, including potential additional analyses (e.g., identification of intermittent streams), data formatting, and map and figure development.

SubTask 6.1. Assist with revisions of submitted manuscript

The Contractor shall assist with revisions on the manuscript of the Northeastern analytical framework for monitoring.

> *Task 6.1 Deliverable 6.1:* Revised analytical framework manuscript as submission to journal due 2 weeks before end of Option Year 1.

SubTask 6.2. Assist with classification manuscript

The Contractor shall assist with a manuscript based on the classification analyses for Regions 1-4, including potential additional analyses (e.g., identification of intermittent streams), data formatting, and development of figures and maps.

Task 6.2 Deliverable 6.2: Final figures and input to manuscript on classification analyses due 2 weeks before end of Option Year 1.

SCHEDULE OF BENCHMARKS & DELIVERABLES:

Task No.	SubTask No.	DELIVERABLE	Incremental Schedule
1	1.1	**1.1.A.** Brief, written progress reports.	Due monthly or upon request by the WAM for the duration of this Task Order.
1	1.1	**1.1.B.** Project meetings and other communications, such as conference calls, as needed.	Due upon request by the WAM for the duration of this Task Order.
1	1.2	**1.2.A.** Updated QAPP (if necessary)	Due 30 days after WA award.
1	1.2	**1.2.B.** Revised QAPP	Due 1 week after WAM comments
2	2.1	**2.1.A.** Outline	Due 2 weeks after initiation
2	2.1	**2.1.B.** Draft manuscript	Due 8 weeks after receiving comments from WAM on 2.1.A.
2	2.2	**2.2.A.** Finalize analyses	Due 2 weeks after initiation
2	2.2	**2.2.B.** Draft outline	Due 3 weeks after approval of Deliverable 2.2.A.
3	3.1	**3.1.** Follow-up webinar with RSCs	Due in September 2014
3	3.2	**3.2.A.** Draft classification	Due 6 weeks after initiation
3	3.2	**3.2.B.** Revised climate velocities and examination of thermal thresholds	Due 3 weeks after Deliverable 3.2.A
3	3.2	**3.2.C.** Webinars with Regions 5 and 7	Due 2 weeks after Deliverables 3.2.A and B
3	3.3	**3.3.** Transmit output data	Due 2 weeks before end of Option Year 1
4	4.1	**4.1.A.** List of experts	Due 1 week after initiation
4	4.1	**4.1.B.** Initial call and subsequent webinars	Due 2 weeks after Deliverable 4.1.A

4	**4.2**	**4.2.** Draft outline	Due 2 weeks after call/webinar with ESC
5	**5.1**	**5.1.** Finalize external peer review responses	Due 1 week after initiation
5	**5.2**	**5.2.** Response to internal review comments	Due 4 weeks after receipt of comments from WAM
6	**6.1**	**6.1.** Revised analytical framework manuscript	Due 2 weeks before end of Option Year 1
6	**6.2**	**6.2** Final figures and input to classification manuscript	Due 2 weeks before end of Option Year 1

REPORTING

All documentation and reporting under this Task Order shall be in compliance with contract requirements. See contract clause F.2, F.3, and J.2 "List of Attachments, Number 2 - Reports of Work".

Additional requirements specific to this Task Order are as follows:

Electronic deliverables must be in an original file format that can be supported by EPA after the end of the Period of Performance of the Task Order. The standard office software at EPA is MS Office. The standard GIS software at EPA is ESRI ArcGIS.

TRAVEL

No travel is required under this TO.

CONTRACTOR IDENTIFICATION

Contractor personnel shall always identify themselves as Contractor employees by name and organization and physically display that information through an identification badge. Contractor personnel are prohibited from acting as the Agency's official representative.

The Contractor shall refer any questions relating to the interpretation of EPA policy, guidance, or regulation to the Task Order Manager.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-01

☐ Other ☒ Amendment Number: 000002

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014	
	Base Option Period Number 1	

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☒ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

		Cost/Fee:	LOE:
Contract Period:	09/30/2012 To 09/29/2014	$129,733.00	1230
This Action:		$32,008.00	278
Total:		$161,741.00	1,508

Work Plan / Cost Estimate Approvals

		Cost/Fee:	LOE:
Contractor WP Dated:	07/09/2014	$32,008.00	278
Cumulative Approved:		$161,741.00	1,508

Work Assignment Manager Name: Britta Bierwagen (Signature) (Date)		Branch/Mail Code: Phone Number: 703-347-8613 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)		Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)		Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature)	08/14/14 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-02

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014	Phase III Analysis & Reporting
	Base Option Period Number 1	

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW: 2e

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

[ ] Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2): [ ]

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
09/30/2012 To 09/29/2014		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Thomas Johnson (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8618 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) 09/26/13 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Work Statement
Tetra Tech, Inc.
Contract EP-C-12-060
Work Assignment 1-02

I. Title: Phase III analysis and reporting on watershed and lake simulations of the effects of climate change on U.S. rivers and lakes

II. Period of Performance: September 30, 2013 though September 29, 2014

III. Work Assignment Manager:
Thomas Johnson, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Assessment (8601-P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
703-347-8618 (phone)
703-347-8694 (fax)
johnson.thomas@epa.gov

Alternate WAM:
Christopher Clark, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Assessment (8601-P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
703-347-8619
clark.christopher@epa.gov

IV. Background:
The EPA Office of Research and Development's Global Change Impacts and Adaptation (GCIA) staff within the Air, Climate and Energy (ACE) National Program assesses the potential vulnerability to climate change of EPA's ecosystem, water, human health and air protection efforts, as well as adaptation options to build resilience in the face of these vulnerabilities. Assessment activities in the GCIA aquatic ecosystems focus area support EPA's mission and responsibilities as defined by the Clean Water Act (CWA), and are designed to build the capacity of EPA program and regional offices, water and wetland managers, and other decision-makers to assess and respond to global change impacts on water quality and aquatic ecosystems.

EPA ORD recently completed two water modeling projects assessing the potential effects of climate change on the quantity and quality of U.S. water resources. The first project, referred to as "20-Waterheds", evaluates the sensitivity of streamflow and water quality to climate change in 20 U.S. watersheds. The second project, referred to as the "Lakes" project, evaluates the potential effects of climate change on the thermal structure and mixing regime of different archetypes of lakes and reservoirs.

<u>20 Watersheds Project</u>

The "20-Watershed" project has generated an unprecedented, large dataset of watershed simulation results including daily time series of streamflow, total N, total P, and suspended sediment loads at approximately the HUC8 sub-watershed scale in 20 U.S. watersheds under a range of future climate and urbanization scenarios. Watershed modeling was conducted using the Hydrologic Simulation Program-FORTRAN (HSPF) and Soil and Water Assessment Tool (SWAT) watershed models. Climate change scenarios are based on dynamically downscaled (50x50 km^2) output from four of the GCMs for the period 2041-2070 archived by the North American Regional Climate Change Assessment Program (NARCCAP). Urban and residential development scenarios are based on EPA's Integrated Climate and Land Use Scenarios (ICLUS) project. Model simulations were completed under a previous Work Assignment by Tetra Tech, Inc.

Analyses and reporting on the results of this work are currently underway. A set of four manuscripts are in different stages of preparation for publication in scientific journals. The topics covered by these four papers are (1) regional variability of hydrologic effects, (2) the sensitivity of simulated changes to the watershed model used, (3) the sensitivity of simulated changes to climate model and downscaling approach used, and (4) the interaction between climate change and urbanization. Each manuscript will be submitted to a peer reviewed journal for peer review and publication. Following peer review by the journals, draft papers will require revision to address peer review comments and be resubmitted for publication.

Lakes Project

The "Lakes" project involves 1-D lake modeling of the potential effects of climate change on the thermal characteristics of different archetypes of U.S. lakes and reservoirs. Lake modeling was conducted using the CLM Lake model. Climate change scenarios are based the same projections used in the 20-watershed project: dynamically downscaled (50x50 km^2) output from four of the GCMs for the period 2041-2070 archived by the North American Regional Climate Change Assessment Program (NARCCAP). Model simulations were completed under a previous Work Assignment on this contract by Tetra Tech, Inc.

Analyses and reporting on the results of the Lakes project is currently underway. A draft manuscript has been prepared for publication in a scientific journal. When complete, the manuscript will be submitted to a peer reviewed journal for peer review and publication. Following peer review by the journal, the draft paper will require revisions to address peer review comments and be resubmitted for publication. Additional analysis including new simulations for additional climate change scenarios may also be required to complete this manuscript.

V. Objectives:

This Work Assignment is for tasks to be performed during Option Year 1 of the current contract. This Work Assignment is for additional analyses, technical writing and other support to prepare written manuscripts based on modeling results from the 20-Watershed and Lakes projects to be submitted for publication in peer reviewed scientific journals. Completion of tasks may require statistical analysis of hydrologic and water quality simulation data, preparation of technical figures and tables, technical writing, technical reviews of written manuscripts, revising written manuscripts to address peer review comments, and other activities related to the production and dissemination of products resulting from these two projects. Specific tasks and deliverables are listed below.

VI. Tasks and Deliverables

Task 1 – Prepare workplan, establish communication, and develop QAPP

SubTask 1.1. Prepare work plan and cost estimate

The Contractor shall prepare a work plan in response to this work assignment, outlining the proposed approach, expertise and staffing, and resources needed, and a schedule to complete each task. The work plan should identify potential data and tools needed and any potential problems that might be encountered during the execution of the work assignment.

SubTask 1.2. Establish communication
Establish communication with the COR and develop a regular reporting schedule The Contractor shall contact the COR and schedule a kickoff project meeting. In collaboration with the COR the Contractor shall also establish a schedule for regular progress reports, project meetings, and other communications throughout the period of performance of this Work Assignment.

> *Deliverable 1.2.A:* Brief, written progress reports as email to the COR. Due monthly or upon request by the COR for the duration of this Work Assignment.
>
> *Deliverable 1.2.B:* Project meetings and other communications, such as conference calls, as needed. Due upon request by the COR for the duration of this Work Assignment.

SubTask 1.3. Development of a QAPP
All work conducted under this Work Assignment shall be performed pursuant to an EPA approved Quality Assurance Project Plan (QAPP). The QAPP shall outline the approach and measures the Contractor will implement to ensure a high standard of quality in data analysis and written deliverables. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this Work Assignment relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this Work Assignment relevant to geospatial data will reference *Guidance for Quality Assurance Project Plans for Geospatial Data* (EPA QA/G-5G). Elements from these sources will be used to derive a single QAPP for this Work Assignment.

The technical and QA requirements of tasks in this Work Assignment are related to tasks in previous Work Assignments under this contract (EP-C-12-060; Contract Base Year). A new, approved QAPP is required for this WA. However, is acceptable for the Contractor to develop the new QAPP using protocols and language from previously approved QAPPs for WA-02 and WA-09 under this contract (EP-C-12-060; Contract Base Year).

> *Deliverable 1.3.A*: A draft QAPP submitted to the COR for review. Due 2 weeks after award.
>
> *Deliverable 1.3.B*: A revised QAPP addressing COR comments on the draft submitted to the COR for approval. Due 1 week after receiving COR comments on Deliverable 1.3.A.

Task 2 – Technical support to complete, submit, and revise 4 manuscripts from the 20-Watershed project for publication in peer reviewed scientific journals

In consultation with the COR the Contractor shall provide technical support as necessary to complete and submit for publication in peer reviewed scientific journals manuscripts addressing four subject areas: (1) characterization of national and regional trends in vulnerability related to climate and land use change, (2) assessment of land use—climate interactions at various scales, (3) comparison of climate model downscaling techniques used in the 20-Watershed project, (4) comparison of HSPF and SWAT watershed models in the context of coupled climate-watershed model assessments. Work is currently underway on each of these manuscripts and the analyses and writing are at different stages of development. EPA will lead the analysis and writing of manuscripts 1-3 above with technical support as needed from the

Contractor. The Contractor shall lead the analysis and writing of manuscript 4 above with support as needed from EPA.

Each of the 4 manuscripts will undergo 2 stages of peer review; an internal peer review by EPA staff, followed by external peer review by the journal to which it was submitted. In each case, after receiving peer review comments, the Contractor shall, in consultation with the COR, develop a strategy for revising each manuscript and provide technical support to make the necessary revisions, to document in writing the authors responses to peer review comments, and to re-submit each manuscript for publication. The time required for journal peer review can vary, but could take as long as 6-9 months after submission.

Required technical support could include extracting and summarizing data from 20-Watershed project simulation dataset, statistical analysis of simulation results, preparation of technical figures and tables, technical writing, technical reviews of written manuscripts, and revising written manuscripts to address journal peer review comments.

All written products shall be written in clear, concise prose consistent with the standards of peer reviewed scientific literature (e.g., suitable for publication in technical journals such as the Journal of the American Water Resources Association, Environmental Research Letters, Water Resources Research).

> *Deliverable 2.A*: Draft manuscript for submission to journal on comparison of HSPF and SWAT watershed models for climate change assessments. Due by Dec. 31, 2013.
>
> *Deliverable 2.B*: Final manuscript addressing journal peer review comments on Deliverable 2.A for publication, and written documentation of author's response to review comments. Due 4 weeks after receiving journal peer review comments or as requested by the COR.
>
> *Deliverable 2.C*: Technical support as requested by the COR to complete, submit and address peer review comments for 3 manuscripts prepared by EPA for publication in peer reviewed journals. Due as needed from award through Sept. 29, 2014.

Task 3 – Technical support to complete, submit, and revise manuscripts from the Lakes project for publication in peer reviewed scientific journals

In consultation with the COR the Contractor shall provide technical support as necessary to complete and submit for publication in a peer reviewed scientific journal a manuscript addressing the potential effects of climate change on the thermal and mixing dynamics of different types of lakes and reservoirs. The Contractor shall lead the analysis and writing of this manuscript with support from the COR.

The manuscript will undergo 2 stages of peer review; an internal peer review by EPA staff, followed by external peer review by the journal to which it was submitted. In each case, after receiving peer review comments, the Contractor shall, in consultation with the COR, develop a strategy for revising each manuscript and provide technical support to make the necessary revisions, to document in writing the authors responses to peer review comments, and to re-submit each manuscript for publication. The time required for journal peer review can vary, but could take as long as 6-9 months after submission.

Required technical support could include extracting and summarizing data from the Lakes project simulation dataset, statistical analysis of simulation results, preparation of figures and tables, technical writing, technical reviews of written manuscripts, and revising written manuscripts to address journal peer review comments.

All written products shall be written in clear, concise prose consistent with the standards of peer reviewed scientific literature (e.g., suitable for publication in technical journals such as the Journal of the American Water Resources Association, Environmental Research Letters, Water Resources Research).

Deliverable 3.A: Draft manuscript for submission to journal on the effects of climate change on different types of lakes and reservoirs. Due by Dec. 31, 2013.

Deliverable 3.B: Final manuscript addressing journal peer review comments on Deliverable 3.A for publication by journal, and written documentation of author's response to review comments. Due 4 weeks after receiving journal peer review comments or as requested by the COR.

Task 4. Technical Support to EPA ORD and EPA Partners as Needed

A number of EPA ORD and EPA partners will use 20 watershed project models and the 20 watershed dataset to support new research efforts. EPA ORD and EPA partners may also want to access or otherwise use the simulation dataset developed in the Lakes project.

The Contractor shall provide technical support to EPA and EPA partners as needed and approved by the COR. Technical support will include access to 20 Watershed (HSPF and SWAT) and Lakes (CLM) models and input data, and accessing data from the 20-Watershed and Lakes datasets. Technical support shall not exceed 20 hours for the entire period of performance of this Work Assignment without approval of the COR.

Deliverable 4.A: Technical support to EPA and EPA partners as needed and approved by the COR on accessing and use of 20-Watershed and Lakes project models and simulation datasets. Due as needed from award of Work Assignment through Sept. 29, 2014 (end of contract option year 1).

VII. Schedule of Milestones and Deliverables:

Task No.	DELIVERABLE	SCHEDULE
1	1.2.A. Progress reports	Due monthly
1	1.2.B. Other communication	Due upon request by the COR
1	1.3.A. Draft QAPP	Due 2 weeks after award
1	1.3.B. Final QAPP	Due 1 week after receiving COR comments on 1.3.A
2	2.A. Draft manuscript for submission to journal on comparison of HSPF and SWAT	Due Dec. 31, 2013
2	2.B. Final manuscript addressing journal peer review of Deliverable 2.A for publication	Due 4 weeks after receiving journal peer review comments

2	2.C. Technical support to submit and publish 3 manuscripts on 20-Watershed project prepared by EPA	Award through Sept. 29, 2014 (end of Contract Option Year 1)
3	3.A. Draft manuscript for submission to journal on lake response to climate change	Due Dec. 31, 2013
3	3.B. Final manuscript addressing journal peer review of Deliverable 3.A for publication	Due 4 weeks after receiving journal peer review comments
4	4.A. Technical support to EPA partners for use of 20 watershed and Lakes project datasets	Award through Sept. 29, 2014 (end of Contract Option Year 1)

VIII. Acceptance Criteria:
The Contractor shall prepare high quality technical and written deliverables. The Deliverables shall be edited for grammar, spelling, and logic flow. The technical information shall be reasonably complete and presented in a logical, readable manner. Figures submitted shall be of high quality similar to presentations developed for national scientific forums and should be formatted as jpeg or png files. Text deliverables shall be provided in Microsoft Word 2007 or compatible format.

IX. Conflict of Interest:
The Contractor warrants that, to the best of the Contractor's knowledge and belief, that there are no relevant facts or circumstances which could give rise to a conflict of interest, as defined in FAR subpart 9.5, or that the Contractor has disclosed all such relevant information.

The Contractor agrees to notify the Contracting Officer immediately, that to the best of its knowledge and belief, no actual or potential conflict of interest exists or to identify to the Contracting Officer any actual or potential conflict of interest the Contractor may have.

The Contractor agrees that if an actual or potential conflict of interest is identified during the performance, the Contractor shall immediately make a full disclosure in writing to the Contracting Officer. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consulting with the Contracting Officer, to avoid, mitigate, or neutralize the actual or potential conflict of interest.

The Contractor shall continue performance until notified by the Contracting Officer of any contrary action to be taken.

X. Management Controls:

1. The EPA will review and provide comments on the Work Plan and QAPP.

2. The EPA will also review and provide comments on subsequent deliverables.

3. The Contractor shall clearly identify itself as an EPA contractor when acting in fulfillment of this contract. No decision-making activities relating to Agency policy, enforcement or future contracting shall take place if the Contractor is present. If the Contractor has a need to meet with Federal employees on-

site, then the Contractor personnel shall visibly wear identification in performance of this contract while on-site that will be issued by the Government upon arrival to the Federal facility.

4. Technical Direction: The WAM is authorized to provide technical direction that clarifies the statement of work as set forth in this work assignment. Before initiating any action under technical direction, the contractor shall ensure that the technical direction falls within the scope of work for this work assignment. The technical direction shall be issued in writing by the WAM within four working days of verbal issuance. This will be forwarded to the PO and CO for their information and necessary actions. The WAM/COR is the only person authorized to make changes to this work assignment or contract. The changes must have prior approval from the WAM/COR in writing as an amendment or modification to the work assignment or contract. Technical direction includes direction to the contractor that assists the contractor in accomplishing individual tasks deemed appropriate under the Statement of Work, as well as comments and approval of reports and other deliverables

XI. Notice Regarding Guidance Provided Under This Work Assignment:
Guidance by the Contractor is strictly limited to management and analytical support. The Contractor shall not engage in activities of an inherently governmental nature such as the following:

1. Formulation of Agency policy

2. Selection of Agency priorities

3. Development of Agency regulations

Should the Contractor receive any instruction from an EPA staff person that the Contractor ascertains to fall into any of these categories or goes beyond the scope of the contractor or work assignment, the Contractor shall immediately contact the Project Officer or the Contract Specialist. The Contractor shall also ensure that work under this individual work assignment does not contain any apparent or real personal or organizational conflict of interest. The Contractor shall certify that none exists at the time the work plan is submitted to EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-02

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014	Phase III Analysis and Reporti
	Base Option Period Number 1	

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [X] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

[ ] Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2):

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 09/30/2012 To 09/29/2014	$0.00	0
This Action:	$61,584.00	578
Total:	$61,584.00	578

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated: 10/18/2013	$61,584.00	578
Cumulative Approved:	$61,584.00	578

Work Assignment Manager Name: Thomas Johnson (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8618 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley Mark E Cranley (Signature) 11/14/2013 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-02

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	Watershed and Lake Simulations

Contractor	Specify Section and paragraph of Contract SOW
TETRA TECH, INC.	2e

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:
Please provide a WP and Cost Proposal addressing the added tasks included in this amendment NLT 07/09/2014.

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
09/30/2012 To 09/29/2014		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Thomas Johnson (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8618 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) 06/24/14 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

Tetra Tech, Inc.
Contract EP-C-12-060
Work Assignment WA 1-02
Amendment 1

I. Title: MODIFICATION: Phase III analysis and reporting on watershed and lake simulations of the effects of climate change on U.S. rivers and lakes

II. Period of Performance: Award though September 29, 2014 (end of contract current option year)

III. Work Assignment Manager:
Thomas Johnson, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Assessment (8601-P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
703-347-8618 (phone)
703-347-8694 (fax)
johnson.thomas@epa.gov

Alternate WAM:
Christopher Clark, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Assessment (8601-P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
703-347-8619
clark.christopher@epa.gov

IV. Total Estimated LOE: Current contract year (through Sept 29, 2014)

V. Tasks and Deliverables

Task M1 – Revise 4 draft manuscripts based on 20 Watersheds project results as needed to address peer review comments

Four draft manuscripts based on results from the 20 Watersheds project have been completed. Three of these manuscripts have been submitted for publication in peer reviewed scientific journals: (1) *Modeling streamflow and water quality sensitivity to climate change and urban development in 20 U.S. watersheds*, (2) *The effects of downscaling method on the variability of simulated watershed response to climate change*, and (3) *Evaluation of hydrology under changing climatic conditions in the Sub-Arctic Cook Inlet watershed using SWAT*. Each manuscript is currently being peer reviewed by the journal to which it was submitted. EPA anticipates receiving journal peer review comments and a decision regarding acceptance for publication on each paper during May-July, 2014.

In consultation with the COR, the Contractor shall provide technical support to revise each of the three manuscripts to address journal peer review comments leading to acceptance of each manuscript for journal publication. In each case, after receiving peer review comments, the Contractor shall, in consultation with the COR, develop a strategy for revising each manuscript and provide technical support to make the necessary revisions, to document in writing the authors responses to peer review comments, and to re-submit each manuscript for publication. If any manuscript is rejected for publication by a journal, in consultation with the COR the contractor shall identify a suitable alternative journal for submission, and revise the manuscript as necessary for submission to the selected alternate journal.

The fourth draft manuscript from the 20 Watershed project has been completed by EPA: (4) *Relative effects of mid-21st century urban development versus climate change on streamflow and water quality endpoints*. This manuscript will be submitted for EPA internal peer review in May 2014. EPA peer review comments will be available in June 2014. In consultation with the COR, the Contractor shall provide technical support to make the necessary revisions to address peer review comments, and to document in writing the authors responses to peer review comments leading to submittal of this manuscript for publication in a peer reviewed scientific journal. Required technical support on this manuscript could include extracting and summarizing data from the 20 Watersheds project simulation dataset and preparation of summary figures and tables.

All revisions and written materials shall be written in clear, concise prose consistent with the standards of peer reviewed scientific literature (e.g., suitable for publication in technical journals such as the Journal of the American Water Resources Association, Environmental Research Letters, Water Resources Research).

> *Deliverable M1.A*: Revisions to manuscript to address journal peer review comments for manuscript titled "Modeling streamflow and water quality sensitivity to climate change and urban development in 20 U.S. watersheds". Due 4 weeks after receiving journal peer review comments.
>
> *Deliverable M1.B*: Revisions to manuscript to address journal peer review comments for manuscript titled "The effects of downscaling method on the variability of simulated watershed response to climate change". Due 4 weeks after receiving journal peer review comments.
>
> *Deliverable M1.C*: Revisions to manuscript to address journal peer review comments for manuscript titled "Evaluation of hydrology under changing climatic conditions in the Sub-Arctic Cook Inlet watershed using SWAT". Due 4 weeks after receiving journal peer review comments.
>
> *Deliverable M1.D*: Revisions to manuscript to address EPA internal review comments on manuscript on the relative effects of urban development versus climate change. Due 4 weeks after receiving EPA internal peer review comments.

Task M2 – Revise draft manuscript based on the Lakes project as needed to address peer review comments, and provide technical support to develop, conduct data analysis, and complete an outline for a new manuscript based on results from the Lakes project.

One draft manuscript based on results from the Lakes project has been completed and submitted for publication in a peer reviewed scientific journal: (1) *Potential climate change effects on thermal and mixing dynamics of U.S. lakes*. This manuscript is currently being peer reviewed by the journal to which it

was submitted. EPA anticipates receiving journal peer review comments and a decision regarding acceptance for publication on each paper during May-July, 2014.

In consultation with the COR, the Contractor shall provide technical support to revise this manuscript to address journal peer review comments leading to its acceptance for journal publication. After receiving peer review comments, the Contractor shall, in consultation with the COR, develop a strategy for revising the manuscript and provide technical support to make the necessary revisions, to document in writing the authors responses to peer review comments, and to re-submit the manuscript for publication. If the manuscript is rejected for publication by its journal, in consultation with the COR the contractor shall identify a suitable alternative journal for submission, and revise the manuscript as necessary for submission to the selected alternate journal.

Other opportunities also exist for new analysis and publications from the Lakes project. The Contractor shall also provide technical support to develop, conduct data analysis as needed, and complete an outline for a new manuscript based on results from the Lakes projects. The outline shall be developed to guide later development of a manuscript for publication in a peer reviewed scientific journal.

The Contractor shall, in consultation with the COR, propose opportunities for a new analyses based on the Lakes dataset. Potential topics for the new Lakes manuscript include but are not limited to (1) mapping of lake archetypes from the previously completed analysis to actual U.S. lakes, and (2) implications of climate change for management of U.S. lakes and reservoirs. The COR will select a final topic for the new analysis/manuscript from those opportunities proposed by the Contractor. The Contractor shall then provide technical support to conduct analysis and complete an outline for the new manuscript.

Required technical support could include extracting and summarizing data from the Lakes project simulation dataset, statistical analysis of simulation results, preparation of figures and tables, and conducting literature reviews and technical writing. All written products shall be written in clear, concise prose consistent with the standards of peer reviewed scientific literature (e.g., suitable for publication in technical journals such as the Journal of the American Water Resources Association, Environmental Research Letters, Water Resources Research).

> *Deliverable M2.A*: Revisions to manuscript to address journal peer review comments for manuscript titled "Potential climate change effects on thermal and mixing dynamics of U.S. lakes". Due 4 weeks after receiving journal peer review comments.
>
> *Deliverable M2.B*: Outline for a new manuscript based on results from the Lakes project. Due by Sept. 12, 2014.

Task M3. Continuing Technical Support to EPA ORD and EPA Partners

The Contractor shall provide continuing technical support as needed to EPA and EPA partners to access or otherwise use the simulation dataset developed in the 20 Watersheds and Lakes projects. Technical support will include access to 20 Watershed (HSPF and SWAT) and Lakes (LISSS) models and input data, and accessing data from the 20-Watershed and Lakes datasets. Technical support shall not exceed 10 hours for the entire period of performance of this Work Assignment without approval of the COR.

> *Deliverable M3.A*: Technical support to EPA and EPA partners as needed and approved by the COR on accessing and use of 20-Watershed and Lakes project models and simulation datasets.

Due as needed from award of Work Assignment through Sept. 29, 2014 (end of contract option year 1).

Task M4. Secure publishing rights for page fees and open access fees for 2 manuscripts completed under this Work Assignment.

Two manuscripts completed under this WA will be published in peer reviewed scientific journals, (1) Incorporating the Effects of Increased Atmospheric CO2 in Watershed Model Projections of Climate Change Impacts, and (2) Potential Climate Change Impacts on Thermal and Mixing Dynamics of U.S. Lakes. The Contractor shall pay the publisher of each manuscript publication page fees and fees for open access for each of these manuscripts.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-02

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	Watershed and Lake Simulations

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☒ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 09/30/2012 To 09/29/2014	$61,584.00	578
This Action:	$40,000.00	300
Total:	$101,584.00	878

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated: 07/01/2014	$40,000.00	300
Cumulative Approved:	$101,584.00	878

Work Assignment Manager Name: Thomas Johnson (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8618 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) 07/10/14 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-03

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	CADDIS Support

Contractor	Specify Section and paragraph of Contract SOW
TETRA TECH, INC.	2b

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2):

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
09/30/2012 To 09/29/2014		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Susan Norton (Signature) (Date)	Branch/Mail Code:	
	Phone Number: 703-347-8549	
	FAX Number:	
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code:	
	Phone Number: 703-347-8576	
	FAX Number: 703-374-8696	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code:	
	Phone Number:	
	FAX Number:	
Contracting Official Name: Mark Cranley (Signature) 09/26/13 (Date)	Branch/Mail Code: CPOD	
	Phone Number: 513-487-2351	
	FAX Number: 513-487-2109	

PERFORMANCE WORK STATEMENT
CONTRACT NUMBER: EP-C-12-060
WORK ASSIGNMENT NUMBER 1-03

TITLE: Causal Assessment Team Support

WORK ASSIGNMENT MANAGER (WAM):	**Susan Norton** U.S. EPA (MC 8623P) 1200 Pennsylvania Ave. NW Washington, DC 20460 Phone #: 703-347-8549 **Physical and Overnight Delivery Address:** Two Potomac Yard 2733 S Crystal Drive Arlington, VA 22202
ALTERNATE WA MANAGER:	**Michael Griffith** U.S. EPA (MS A-110) 26 W. Martin Luther King Dr. Cincinnati, OH 45268 Phone #: 513-569-7034
PROJECT OFFICER:	**Sharon Boyde** U.S. EPA (MC 8601P) 1200 Pennsylvania Ave. NW Washington, DC 20460 Phone #: 703-347-8576

PERIOD OF PERFORMANCE: September 30, 2013 to September 30, 2014

INTRODUCTION & BACKGROUND

The contractor shall carry out tasks related to ongoing Information Technology (IT) and related support for the Causal Analysis/Diagnosis Decision Information System (CADDIS). CADDIS provides ecological assessment resources for natural resource managers and academics in the context of cause-effect relationships.

The tasks described herein represent activities of low to high technical complexity involving basic maintenance of the CADDIS website and continued development of the website's literature-based evidence tools.

OBJECTIVES

The objectives of this work assignment (WA) are to assist EPA with:

- Continued development of the CADDIS ecological evidence database and its associated user interfaces (the Interactive Conceptual Diagram (ICD) application and the CADDIS Literature Resource (CADLit) and collaborative platforms.
- Continued maintenance of the CADDIS website, including trouble-shooting any operational issues associated with the current website.

The product will be revised ICD and CADlit applications on the contractor's server. Subsequent revisions and migration to the EPA server will be addressed in future work assignments.

MEETINGS

Throughout the WA performance period, the contractor shall schedule meetings (including conference calls and in-person meetings with the Work Assignment Contract Officer Representative (WA-COR) and Alternate WA-COR, as appropriate. For all meetings, the contractor shall prepare and e-mail meeting notes and action items to the WAM within two business days, in text format within e-mail. Meetings shall be planned for and incorporated within the following tasks as appropriate.

TASK 1: Prepare work plan, cost estimate, Quality Assurance Project Plan & monthly reports

The contractor shall prepare and submit a work plan and a cost estimate in response to this WA. This effort will require familiarity with CADDIS; expertise in ecology, information technology, Apex and Java programming, database management, and website design; and knowledge of the U.S. EPA Web Guidelines. The work plan shall include a schedule of deliverables and all interim deliverables.

The contractor shall adapt the Quality Assurance Project Plan (QAPP) prepared for WA-00-03 in response to this work assignment. The QAPP shall be written in accordance with U.S. EPA QA standards outlined in *Requirements for Quality Assurance Project Plans* (EPA QA/R-5), and provided to the WAM and the NCEA QA Manager in electronic form for approval, when the WP and cost estimate are submitted.

The contractor shall prepare and submit monthly reports detailing progress on WA tasks.

TASK 2: Revise literature-based evidence tools on CADDIS

The contractor shall complete revisions to the ICD application and CADLit on their development servers, as per the following subtask and additional details provide per technical directives issued via e-mail from the WA-COR/Alternate WA-COR.

Sub-task 2.1 Revise ICD entry screen and enhance functionality

- Provide a simplified entry screen to the ICD, implementing the design concept provided in Attachment A.
- Provide the ability for users to choose terms from a pick list and have shapes and associated linkages populate a new diagram in a roughly hierarchical form (e.g., human activities and sources at the top, stressors in the middle and responses at the bottom).
- Provide the ability to change the shape type after a shape has been added to a diagram.
- Address additional issues detailed in Attachment B.

Sub-task 2.2 Complete revisions to CADlit user interface

- Test and fix identified bugs in Oracle Apex user interface for CADLit (Attachment C).

TASK 3: Provide general technical support

The contractor shall provide EPA up to 32 hours of general technical support per written technical directives throughout the performance period. This support may include, but shall not be limited to, IT trouble shooting, creation of graphics and figures, organization and compilation of review comments, and other efforts.

DELIVERABLE SCHEDULE

Task	**Description** (deliverables)	**Due date (business days after WA initiation)**
1	**Prepare work plan, cost estimate & QAPP**	15
1	**Prepare monthly reports**	Monthly
2.1	**Draft of simplified entry screen and enhanced ICD functionality on TetraTech server**	105 days
2.2	**Draft CADLit user interface on TetraTech server**	135 days
3	**Provide general technical support**	As needed
	Total Level of Effort	**328 hrs**

Welcome to the CADDIS Interactive Conceptual Diagram (ICD) tool

SEARCH THE DATABASES

Select a database

Search by keyword

Search by cause & effect

GO TO THE ICD TOOL

REGISTER

LOG IN

List of ICD revisions **[last revised 07.24.12]**

ID	DESCRIPTION	DONE?	COMMENTS
VIEW MODE - PUBLIC			
	Restructure the way this is laid out - do not need to maintain consistency with View/Edit mode tabs accessed when users log in These changes can be done in Java, or can have Search Functions straight from html, then only enter Java when log in to ICD.		See mock-up of ICD welcome screen
	Remove functionality: Open Diagram, Diagram Name, Legend, Deselect All, View as Image, Inset & Navigation, References Panel Keep functionality: Log In, Register, Search Databases by Keyword or Cause/Effect, Help		
Search Functions			
	By keyword: User types in multiple keywords, searches chosen fields assuming "and" between different words, and returns Text Search Results window (see below)		
	By cause-effect terms: user selects terms from collapsible pick-list (standardized EEL term list) This could work like the current diagram search - user selects 1 term from list; only terms linked to that term are displayed; user can select a 2nd term; process repeats and results eventually returned in Text Search Results window (see below), organized according to individual cause-effect linkages. If this is too complicated to implement at this point, we can stick with current cause-effect term search, and just not give public users the more in-depth search capability.		
Paper Specific Linkages window			
	Remove Linkages in Open Diagram function Unless Diagrams show diagrams other than 3 EPA ones (i.e., new ones that users have created & linked references to), remove this function as well List the specific cause/effect relationships entered for a paper be under the Cause-Effect Relationship tab, in addition to total number (and rename tab Linkages, to match link on Text Search Results window - although this only needs to be done if Diagrams tab stays - otherwise, heading for window will be sufficient)		
Text Search Results window			
	Change heading to Search Results		
Abstract window			
	Change "Abstract for reference:" heading to "Reference:'		
ENTRY INTO ICD AFTER LOG-IN			
	Have Edit Mode be default setting, so when log in you see the Home: Diagram Settings window		
Home: Diagram Setting window			
	Is it possible to automatically save changes to diagram settings, without having to click the Save Diagram Settings icon?		Not high priority at this point
VIEW MODE - REGISTERED USER			
	Remove Log Out button (can't imagine that users will need to log out)		
Save New Linkage window			
	Can we move Supported Linkage checkbox to top, right of cause/effect shapes? And maybe make it a multi-choice option: Linkage supported/not supported?		
EDIT MODE toolbar			
	Change help text roll-over on Comment icon to read Diagram Comments		
	Change help test roll-over on Arrow icon to read Arrow (rather than Arrow Line)		
	Get rid of ellipsis after Save As button		
	Create different "areas" of toolbar: Inset, Home, Save, Save As, Close Shapes (including Select, Copy, Align) Lines (including Hide) Add/Review Linkages Comments Can we move Help icon to space above (i.e., same line as Diagram Name)?		
	Right now, there's no way to attach linkages others have entered to a diagram - correct? Don't know that we have time to address this, at this point - but it would be nice if when you're creating a diagram, you could select 2 shapes, see what other papers have been entered into the database as linking those shapes, and choose to add them to your diagram.		Low priority: possible future functionality
	This may be related to the above issue - what does the Review button do?		
MISC COMMENTS			
	Fix arrow head direction bug - when I tried to resize an arrow, it switched head direction (but I think if you click on arrow head, it switches back). In general, arrows were doing some funky things...like flipping themselves spontaneously when I opened a saved diagram.		
	When change label or direction in Shape Attributes screen & click Save - add warning message: "You have changed the attributes of this shape, and references linked to this shape may no longer apply. Do you wish to proceed with this change? Click Yes to proceed; click No to cancel your changes and return to this diagram."		
	On Open Diagram screen - make sure all diagram descriptor fields show initially (first entry in list, composite ICD, initially displays without all diagram descriptors; when you select it again, all descriptor fields fill in)		
	fix display of fields when open diagram without logging in - fields not displaying properly, at least not initially		
	make it so registered users do not see Review Citations button displayed at all (right now, see button but can't click on it)		
	Implement 2 colors (black/gray), 3 weights of lines/arrows		
	On laptop, issue with Save button in some pop-ups not being accessible (not shown, and can't scroll down to it)		

CADLit revisions - INTERFACE & DATA [last updated 09.12.12]

Page / Section	Revision	Comment
PUBLIC FUNCTIONS		
	General heading consistency issues: - have above-tab heading be black and large font (as is on all pages) - have below-tab headings be blue on all pages, with thin blue line underneath - size of blue below-tab headings varies across pages. It's okay to have these headings be larger on the public Search the Database page, and smaller on the login accessible pages - but need to be consistent across the login accessible pages (right now, some are large and some are small).	
	General capitalization consistency issues: Use initial caps in all fields - which means options in fields like Publication Type should not be all caps, and all entries in tables (e.g., Cause-Effect Summary) should be initial caps	
CADLit home		
	Revise text On left nav bar, change Login to Login to CADLit	Track changes file to be provided by WAM
Search the Database		
	When I first got to page (before I'd searched anything), said No data found! under Interactive Data Filter section - should not appear until a search has been done	
Keyword Search	Move Dataset column to end of display table (after Details)	
	Did Keyword Search for temperature: Mummert et al. 2003 listed 4 times (so still have duplication issue) - also Huff et al. 2004, Oberlin & Blinn 1997 temperature does not remain in Keyword Search field - should, so folks know what they searched for	
Download	Change text below selection buttons to read: Citations have been selected for download OR No citations have been selected for download (no numbers provided, unless can get it working properly)	
	Select All really only selects all on the given page - either need to change this or make it clear somewhere on page	
	When I hit select cites, hit download, then go back to Search the Database page, a string of numbers appears below the 4 Download Citations buttons - need to get rid of this string On Preview Data table - can get rid of Citation ID column; need Source and Pages info to display	
	When hit Download, get Choose report download format, but only one option - change to say something like" Click below to download an Excel comma-separated values file"	
	In Preview Data table, Journal title is appearing in Keyword column, rather than Source column	

Interactive Data Filter	Add text, either as roll-over tool tip or in box to side, that briefly explains what each of the icons does (Filter, Sort, Select Columns, Reset)	
Reference Display Table	Fix Show/Hide function - when show, the columns space out and stay this way when you hide again	
	Data is not appearing properly e.g., Munn et al. 2002 has lots of fields blank when Show details, but these fields do have data in the old CADLit	This only appears to be an issue in the Public search - under Citation Details page, cite info on Munn et al. 2002 appears properly
Download Citations		
	Page ultimately has 3 buttons: Preview Data, Back to Search, Download (with Download only becoming visible once preview data). Can we: - put these three buttons in 1 line, close together, at left side (rather than having Download off by itself, a little lower, on the right side) - use the same button format as the Search the Databse page (i.e., larger and not blue)?	Don't really care how the buttons look, but would like them to be consistent across pages - or is the difference just the intro page has larger buttons, and rest of pages has standard buttons?
LOGIN FUNCTIONS		
	See comment above about heading consistency issue (under Public Functions)	
Keyword Search		
	Change Caddis to CADDIS in column heading	
	Modify search functionality (similar to the Public Keyword Search & Manage Taxa pages): - Delete magnifying glass icon, text search field, Go button (i.e., all search functionality based on columns shown in display table) - Have Filter, Sort, Select Columns, Reset icons appear at left - Have other icons appear in Other Actions list to right of icons	This does not look like the Public Keyword Search functionality, in terms of icons and organization - is there a reason for this?
	Add tool tips indicating what happens when user clicks on ID, Title, CADDIS, Dataset	See "tool tip text" worksheet.
Citation Details		
	When Add New Citation, currently have Clear Changes and Create buttons - change to Save Changes, Clear Changes, Delete Citation so buttons match those on other Citation Details pages	
	Journal heading is left justified, while all other headings are right justified - change so that Journal heading matches others	
Link Citations to CADDIS		
	In Citations Linked to Selected Page section: have selected page name listed at top, remove CADDIS page name column, and then display Author (Year) Title for citations	
	Make sure to delete test pages	
	Under Pages currently linked to, change Delete to Delete Link to Page and offset from page title a bit	
Dataset List		
	Change Dataset Id to ID in column heading	

Dataset Details - Dataset Context tab		
	Add tool tips for each field (i.e., roll-over text that explains what each field means)	See "tool tip text" worksheet.
	Need to check all options in different fields - lots of CADLit/EEL duplication, need to separate out Source Data and Study Type entries, etc.	Example below for Source Data & Study Type, but guessing this is true for other fields as well
	Consistently use all initial caps or lowercase for all pull-down menu entries	
	Have citation at top appear in same font across tabs - so make smaller font here, to match Cause-Effect tab	
Study Design	Source Data should be required field, with following options: field, lab mesocosm, model, other	
	Study type should have following options: manipulation, observation, model, review, metaanalysis, other	
	Don't think we need 2 comment boxes here - delete Sample Details comment box, change title on other to Study Design Comments	
	Can the right side fields be bumped right a bit, so there's a little more space between left and right columns?	
	Set Back to Dataset List button a bit apart from other three buttons (e.g., as it's shown on the Cause-Effect tab)	
Location	Under Habitat options should be: stream, lake, reservoir, estuary, marine, wetland, floodplain, riparian, artificial, other Elevation Units have 1-10, rather than units - change to units Make blue line at bottom of Location section thicker, so it's clear that Treatment Class is a separate section of page from top 2 sections Under Ecoregion, why are Alaska Peninsula Moumtains listed 3 separate times?	Currently have some duplication of options
Treatment Class	MG had an issue with Treatment Classes from another paper being displayed initially: - when he tried to delete them he got an error message - when he tried to save, got another error message and did not save treatment classes	More of a data issue - but will need to revisit this when we check the data
General Data Check	Looked at Dataset Details for Aldridge et al. 1987: Study Type is getting pulled into Study Design Comments field (in addition ot where it's supposed to appear) Where did Dataset Design Type info go (ordinal quantitative, discrete classes)? Control/ref type = none, but did not carry over into new system Treatment classes appear to be listed twice (infrequent, infrequent, frequent, frequent) Trajectory listed as NEF? Not sure what this means... Cause measure is not getting transferred appropriately to Cause Details page (e.g., suspended mineral sediment shows up as current velocity on Cause Details page)	
Dataset Details - Cause-Effect tab	Consistently use all initial caps or lowercase for all pull-down menu entries	
	Add tool tips for each column heading (i.e., roll-over text that explains where you go if you click column heading)	See "tool tip text" worksheet.

	Because it looks like we have some real estate to the right side now, add Analysis column heading about the Analysis Details page icon in right-most column	
	Make trajectory abbreviations in table all lowercase (e.g., dec)	
Cause Effect Summary		
	Change Cause-Effect Summary heading to blue font (and use consistent size - so I guess stick with the smaller blue font here, rather than the large blue font which I think is only on the public search page)	
	Do we need a Delete Entry button in addition to Save Changes / Clear Changes, or did we decide we didn't? Can't remember…	
	Under Effect trajectory, 1351 needs to be deleted as an option	
	When add new cause-effect pair, buttons on page should be Save Changes / Clear Changes to match what appears on page for existing pairs	Current buttons are Clear Changes and Create
	In add new term section, have EEL term checkbox only appear for folks with admin rights?	Final decision to be discussed with WAM
	In Organism pop-up list: - why is % listed at top? Seems like this should be deleted - can we make the SPECIES, GENUS, FAMILY, etc. distinction that appears after each entry a bit more subtle [e.g., Abedus (genus)]	
Cause Details		
	Change Cause Measured Unit to Units Delete abbreviations at beginning of each media entry	
	Change buttons to Save Changes / Clear Changes / Delete Entry (if we decided we need a Delete Entry button)	Current buttons are Clear Changes and Create
	Fix blue line under heading, so that it display under heading but above buttons on right	
Effect Details		
	Change Effect Measured Unit to Units Delete abbreviations at beginning of each units entry	
Analysis Details		
	For all sections, buttons should be: Save Changes / Clear Changes / Delete Entry (if we decided we need a Delete Entry button)	
	Group Study Design Summary, Statistical Results, and SI Importance sections together, with one set of buttons - Save Changes / Clear Changes - for these sections	
	Then have thicker blue line sectioning off the Cause-Effect Values table, with its own set of buttons	
Study Design Summary	Add text to indicate that can go to Dataset Context tab to edit this material	
	Add Source Data category here, in addition to Study Type	See comment under Dataset Context tab above
	Data under Study Design should be populated based on what was entered under Dataset Context tab, but not editable in this section - should have to go back to Dataset Context tab to edit	
Cause Effect Values	Table goes off page - can we shorten a bit?	

Statistical Results	
SI Importance	
Manage Lookups	
	Tab should only be visible for Admin users
	Make blue line displays correctly under Entity Type Name heading
	Delete Manage Lookups Form and blue line under tabs, that appears when you select an entity type name
	Needs to be laid out a bit better. Do we need two sets of buttons - 1 for adding entity type names, and 1 for addiing options within entity types? If so, buttons should be placed to make this clearer
General Data Check	When try to save new rows, get errors and a message that said: "Current tabular form data is too old; the source data has been modified. Click here to discard your changes and reload the data from the database." Need to check that this is working properly.
Review Citations	
	Tab should only be visible for Admin users
	Fix typo in Administrator Tools heading (currently Administator Tools

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-03

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	CADDIS Support

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [X] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2):

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 09/30/2012 To 09/29/2014	$0.00	0
This Action:	$37,731.00	328
Total:	$37,731.00	328

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated: 11/04/2013	$37,731.00	328
Cumulative Approved:	$37,731.00	328

Work Assignment Manager Name: Susan Norton (Signature) (Date)		Branch/Mail Code: Phone Number: 703-347-8549 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)		Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)		Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley Mark Cranley (Signature)	11/14/13 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-03

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	CADDIS Support

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW: 2e

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:
Please provide a WP and Cost proposal for the amendment NLT 07/10/2014.

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 09/30/2012 To 09/29/2014		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Susan Norton (Signature) (Date)	Branch/Mail Code:	
	Phone Number: 703-347-8549	
	FAX Number:	
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code:	
	Phone Number: 703-347-8576	
	FAX Number: 703-374-8696	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code:	
	Phone Number:	
	FAX Number:	
Contracting Official Name: Mark Cranley (Signature) 06/25/14 (Date)	Branch/Mail Code: CPOD	
	Phone Number: 513-487-2351	
	FAX Number: 513-487-2109	

CONTRACT NUMBER: EP-C-12-060

WORK ASSIGNMENT NUMBER 1-03

Amendment 1

TITLE: Causal Assessment Team Support

WORK ASSIGNMENT MANAGER (WAM): Susan Norton
U.S. EPA (MC 8623P)
1200 Pennsylvania Ave. NW
Washington, DC 20460
Phone #: 703-347-8549
Physical and Overnight Delivery Address:
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Arlington, VA 22202

ALTERNATE WA MANAGER: Michael Griffith
U.S. EPA (MS A-110)
26 W. Martin Luther King Dr.
Cincinnati, OH 45268
Phone #: 513-569-7034

PROJECT OFFICER: Sharon Boyde
U.S. EPA (MC 8601P)
1200 Pennsylvania Ave. NW
Washington, DC 20460
Phone #: 703-347-8576

PERIOD OF PERFORMANCE: September 30, 2013 to September 29, 2014

INTRODUCTION & BACKGROUND

The contractor shall carry out tasks related to ongoing Information Technology (IT) and related support for the Causal Analysis/Diagnosis Decision Information System (CADDIS). CADDIS provides ecological assessment resources for natural resource managers and academics in the context of cause-effect relationships.

The tasks described herein represent activities of low to high technical complexity involving basic maintenance of the CADDIS website and continued development of the website's literature-based evidence tools.

OBJECTIVES

The purpose of this amendment is to expand revisions to the Interactive Conceptual Diagram (ICD) application to a 5-tab structure.

The objectives of this work assignment (WA) are to assist EPA with:

- Continued development of the CADDIS ecological evidence database and its associated user interfaces (the Interactive Conceptual Diagram (ICD) application and the CADDIS Literature Resource (CADLit) and collaborative platforms.
- Continued maintenance of the CADDIS website, including trouble-shooting any operational issues associated with the current website.

The product will be revised ICD and CADlit applications on the contractor's server. Subsequent revisions and migration to the EPA server will be addressed in future work assignments.

MEETINGS

Throughout the WA performance period, the contractor shall schedule meetings (including conference calls and in-person meetings with the Work Assignment Contract Officer Representative (WA-COR) and Alternate WA-COR, as appropriate. For all meetings, the contractor shall prepare and e-mail meeting notes and action items to the WAM within two business days, in text format within e-mail. Meetings shall be planned for and incorporated within the following tasks as appropriate.

TASK 4.1: Prepare work plan and cost estimate

The contractor shall prepare and submit a work plan and a cost estimate in response to this amendment.
This effort will require familiarity with CADDIS; expertise in ecology, information technology, Apex and Java programming, database management, and website design; and knowledge of the U.S. EPA Web Guidelines. The work plan shall include a schedule of deliverables and all interim deliverables.

The Quality Assurance Project Plan (QAPP) prepared for this work assignment is applicable to this amendment.

Task 4.2: Implement 5-Tab Structure for the Interactive Conceptual Diagram application

The contractor shall expand revisions to the Interactive Conceptual Diagram (ICD) application to a 5-tab format as per Attachment D. The ICD will be revised on the TetraTech server. EPA will provide comments on the draft revision. TetraTech will incorporate comments and finalize the application on the TetraTech server.

DELIVERABLE SCHEDULE

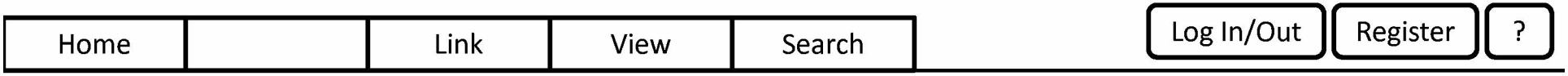
Task	**Description** (deliverables)	**Due date (business days after WA initiation)**
4.1	**Prepare work plan and cost estimates**	15
4.1	**Prepare monthly reports**	Monthly
4.2	**Draft of 5-Tab ICD application on TetraTech server**	60 days
4.2	**Final 5-Tab ICD application on TetraTech server**	90 days

Welcome to the CADDIS Interactive Conceptual Diagram (ICD) tool

	Create/Edit	Link	View	Search	Log In/Out	Register	?

NOTES:

- HOME tab will only have 1 screen, which will be introductory text (no toolbars or diagram space) that includes:
    - General description of tool
    - Explanation of tabs
    - What public vs. registered users can do
        - Link & View tabs shaded out for public users
        - Public users can create new diagram and view EPA-approved data in database
        - Cannot save their diagram or view any other data in database.
    - Some sort of demo diagram – video, actual diagram
- May want to add quick search here for public users – for now keeping this under Search tab



Create new diagram using standard terms

Create new diagram manually

Open existing diagram

NOTES:

- 1st screen under CREATE/EDIT tab is 3 clickable options shown above (no toolbars or diagram space)
    - Click **Create new diagram using standard terms** – takes you to ***Create Diagram Using Standard Terms*** pop-up (Slide 3)
    - Click **Create new diagram manually** – takes you to 2nd screen under CREATE/EDIT tab (Slide 4)
    - Click **Open existing diagram** – takes you to ***Open Existing Diagram*** pop-up (Slide 5) [revised version of current Home: Diagram Settings pop-up] and eventually to 2nd screen under CREATE/EDIT tab (Slide 4)
- May also want some intro text describing what each option does (e.g., links to right, text to left)
- Both "Create new diagram" options will be available to public users, but will need warning so they understand that will not be able to save their diagrams.
- Open existing diagram will be shaded out for public users, but this may change if EPA diagrams become available

Create Diagram Using Standard Terms

Search: Text [autofill with standard terms]

Organize Term List: Pull down: Alphabetically, By Source/Stressor/Response

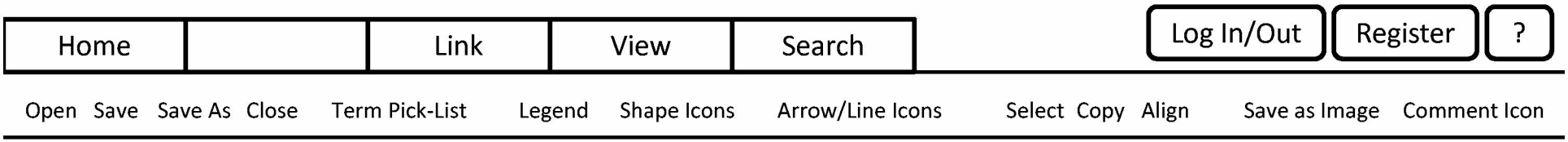
Standard Term List: Scroll down list of all standard terms

- ☐ Industry
- ☐ Nitrogen
- ☐ Water depth
- ☐ Fish
- ☐ Fish abundance

Create New Diagram Using Selected Terms

NOTES:

- Click boxes to select/deselect specific terms
- Clicking Create New Diagram Using Selected Terms places terms, organized hierarchically according to initial shapes, into new diagram
- All functions on this page available to public & registered users, but public users will need warning that they will not be able to save any diagram they create



NOTES:

- 2nd screen of CREATE/EDIT tab brings you to diagram space with toolbar (see above) similar to how current Edit tab/toolbar looks when diagram is open (with a few changes)
    - Icons lists on toolbar refer to individual icons currently on Edit toolbar
    - Term Pick-List allows users to access pick-list again (***Create Diagram Using Standard Terms*** pop-up, Slide 3), where they can either select new or deselect existing shapes – shapes in diagram update accordingly
    - Save, Save As, Comment Icon shaded out for public users
    - Delete Hide/Show line functionality (currently on Edit toolbar)
- Screen shows either shapes selected from pick-list (if user originally selected Create new diagram using standard terms) or blank canvas (if user originally selected Create new diagram manually)
- When manually add shape and start to add text, have autofill from standard term list suggest terms they may want to use
- Users able to change shape and change text within shape by double-clicking on shape/text
    - Brings up ***Shape Attributes*** pop-up (Slide 6)
    - For registered users will need warning if they change text and there are linkages associated with that text
- Allow users to set their own term as synonym to standard term [not sure about this – how/where to implement]?
    - Could have “show all synonyms” option for standard terms
    - Allow user to equate their unique term to a standard term for linkage purposes

Open Existing Diagram

SEARCH DIAGRAMS

Search: Text [hit return to start search]

Browse by: Pull down: Name, Creator, Date

Diagram List: Scroll down list of all diagrams

Open Diagram

Check Out Diagram

Delete Diagram

View Diagram History

DIAGRAM SETTINGS

Save Diagram Settings

Name * : Text

Access * : Pull down: Open, Private

Keywords * : Text

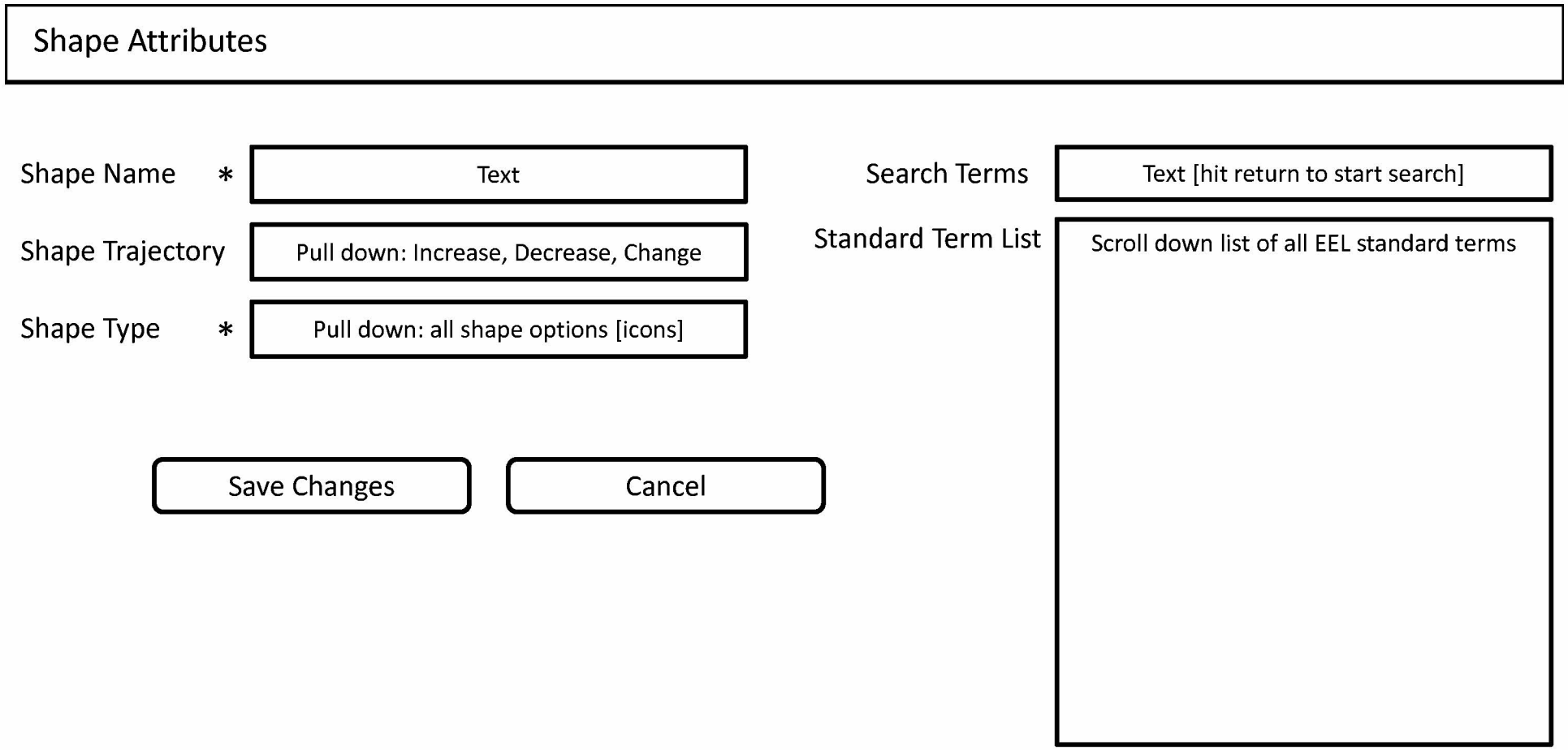
Location * : Text

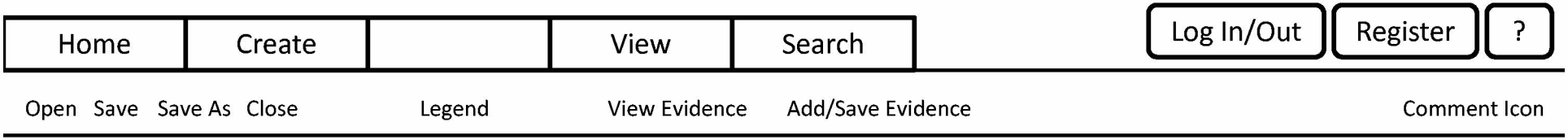
Description : Text

Creator: [name]

Collaborators

Registered Users


Shape Attributes
Shape Name *
Text
Shape Trajectory
Pull down: Increase, Decrease, Change
Shape Type *
Pull down: all shape options [icons]
Save Changes
Cancel
Search Terms
Text [hit return to start search]
Standard Term List
Scroll down list of all EEL standard terms



NOTES:

- Only able to access Link tab when logged in (shaded out for public users)
- Shows non-editable version of open diagram (or blank screen if no diagram opened) – not possible to make edits to diagram under this tab, must return to Create tab
- Click **View Evidence** on toolbar
    - Brings up ***View Linkage Evidence*** pop-up (Slide 8), which lists current diagram terms and references supporting pair-wise linkages among those terms (similar to current Shape Linkages window, except lists all linkages in diagram, not just shape-specific)
    - Only shows linkage evidence already attached to diagram
    - Provide users ability to delete linkage evidence from diagram via checkbox or something similar
    - Allow users to set diagram-specific Evidence Strength categories: strongly supports, supports, ambiguous, does not support
- Click **Add Evidence** on toolbar
    - Select 2 or more shapes (1st one cause, all others effects) on diagram, click **Save Evidence** on toolbar, brings up ***Add New Linkage Evidence*** pop-up (Slide 9)
    - ***Add New Linkage Evidence*** pop-up allows user to:
        - Manually attach new linkage evidence to diagram (current functionality)
        - View other linkages in database for the selected shapes, and select ones to attach to current diagram via checkbox or something similar (new functionality – see ***Search Database(s) for Linkage Evidence*** pop-up, Slide 10)
- Incorporate Review Citations/Linkages (admin functions) into this tab, rather than Home: Diagram Settings window where they currently appear (e.g., these have been deleted from ***Open Existing Diagrams*** pop-up, Slide 5)

View Linkage Evidence

DIAGRAM: [diagram name]

Shape 1 [name] AND Shape 2 [name]

- ☐ 1. [Citation]
  Evidence Strength: Pull-down: Strongly supports, Supports, Ambiguous, Does not support
- ☐ 2. [Citation]
  Evidence Strength: Pull-down: Strongly supports, Supports, Ambiguous, Does not support

Shape 1 [name] AND Shape 3 [name]

- ☐ 1. [Citation]
  Evidence Strength: Pull-down: Strongly supports, Supports, Ambiguous, Does not support

Shape 2 [name] AND Shape 3 [name]

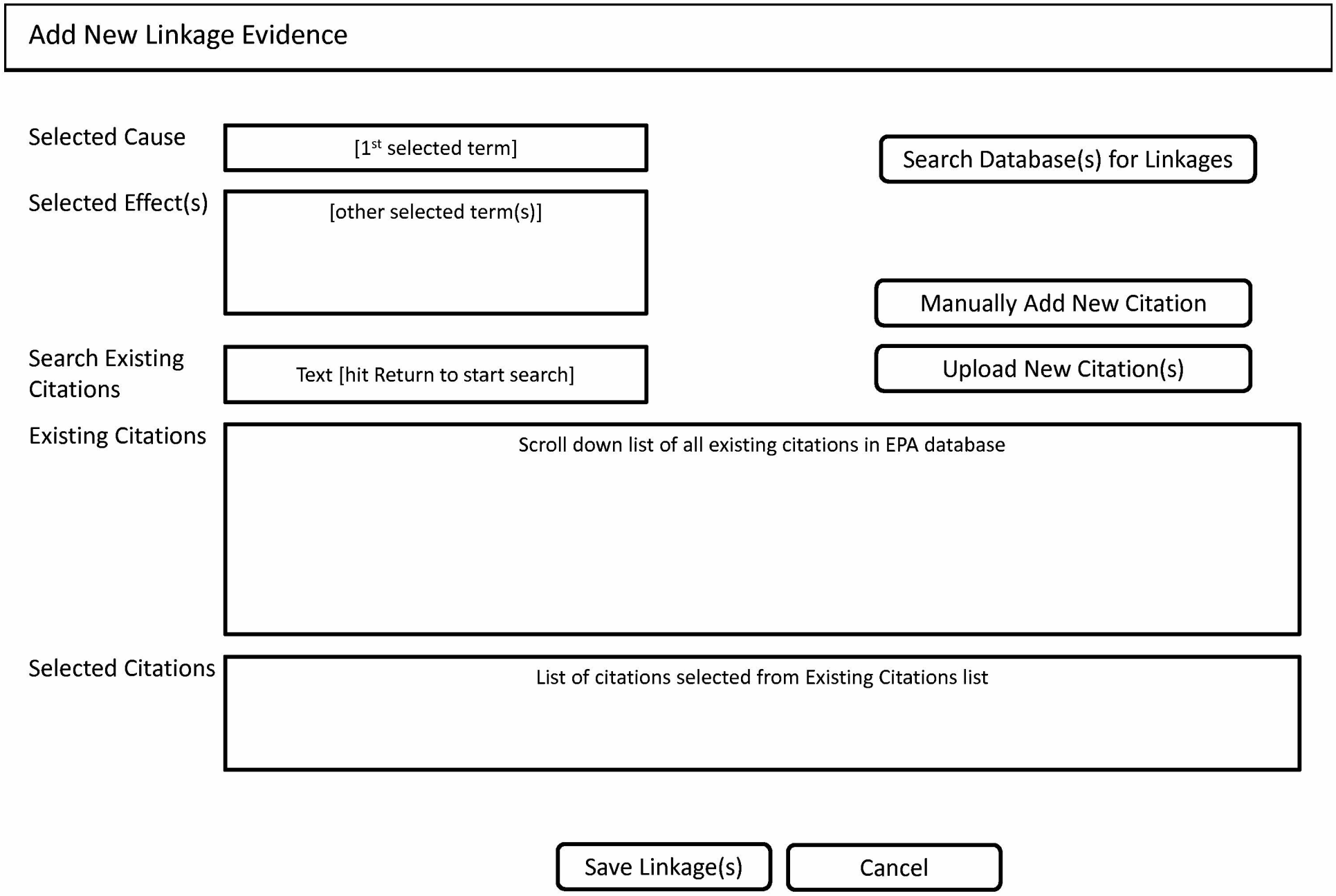
- ☐ 1. [Citation]
  Evidence Strength: Pull-down: Strongly supports, Supports, Ambiguous, Does not support
- ☐ 2. [Citation]
  Evidence Strength: Pull-down: Strongly supports, Supports, Ambiguous, Does not support
- ☐ 3. [Citation]
  Evidence Strength: Pull-down: Strongly supports, Supports, Ambiguous, Does not support

Delete Selected Evidence from Diagram

Update Evidence Strength Settings

Cancel

[scroll down through complete list]


Add New Linkage Evidence
Selected Cause
[1st selected term]
Search Database(s) for Linkages
Selected Effect(s)
[other selected term(s)]
Manually Add New Citation
Search Existing Citations
Text [hit Return to start search]
Upload New Citation(s)
Existing Citations
Scroll down list of all existing citations in EPA database
Selected Citations
List of citations selected from Existing Citations list
Save Linkage(s)
Cancel

Search Database(s) for Linkage Evidence

Select Database(s) Pull-down: All, EPA, Eco Evidence, other

Selected Cause [name] AND Selected Effect 1 [name]

- ☐ 1. [Citation]
- ☐ 2. [Citation]
- ☐ 3. [Citation]

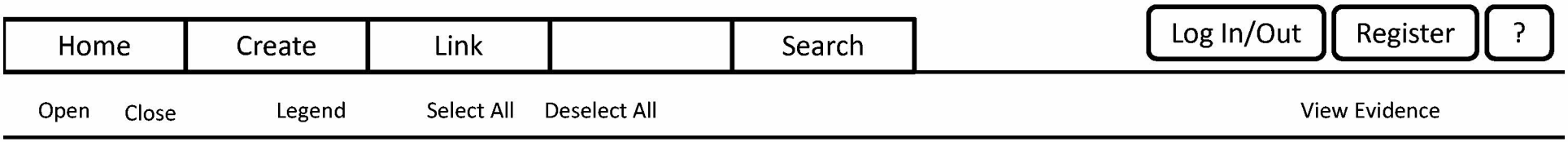
Add Selected Linkage(s)

Cancel

Selected Cause [name] AND Selected Effect 2 [name]

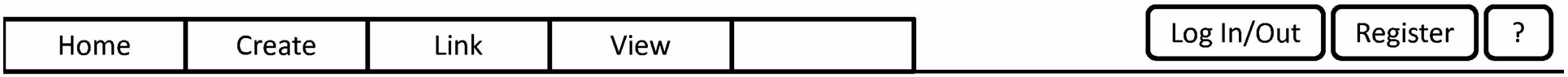
- ☐ 1. [Citation]
- ☐ 2. [Citation]

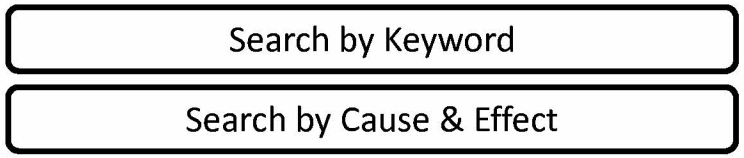
[scroll down through complete list]



NOTES:

- VIEW tab screen is diagram space with toolbar similar to how current View tab/toolbar looks when diagram is open with a few changes
    - Add Select All function to toolbar – selects all shapes that have cites attached to them, allows users to see all cites attached to diagram in View Evidence panel
    - View Evidence similar to current book icon (References Panel) functionality
- Only able to access View tab when logged in (shaded out for public users)
- Only able to view linkages attached to open diagram





NOTES:

- 1st screen of SEARCH tab has 2 clickable options shown above (no toolbars or diagram space)
    - Click **Search by Keyword** – takes you to pop-up where enter keywords
        - What fields does Keyword Search currently search?
    - Click **Search by Cause & Effect** – takes you to pop-up where enter cause and effect terms using autofill with standard terms, organized by source/stressor/response or alphabetically (similar to Slide 3)
    - Allow users to filter either search based on database (EPA-approved, all EPA, Eco Ev, other)
    - Both options are only text search of database – there is no way to attach linkages to a diagram from this tab
- Accessible to public and registered users, but public users only able to access EPA-approved information in database

GENERAL NOTES

- Linkage = cause-effect pair
- Linkage evidence = cause-effect pair and reference (or eventually data, images, etc.) relevant to relationship between that pair
    - Linkage evidence that is EPA-approved (vetted) vs. entered by user community
    - Type/degree of support (strongly supports, supports, ambiguous, does not support)?
- Diagram
    - Different access settings, set by creator
        - Open - viewable by all registered users
        - Private - viewable by creator and any collaborators (currently I don't think these are viewable by admin, but I think we want to change this so admin can view all diagrams)
        - No longer have any public (EPA-approved or vetted) diagrams, although this may change at some point
    - Can attach linkage evidence to one or more diagrams; ideally would be able to vary type/degree of support so they can be specific to reference & diagram, not just reference
- Accessibility of information on linkage evidence & diagrams in database
    - User-based distinctions (EPA, other registered users) vs. settings-based distinctions (open vs. private)
    - User should be able to access/view any linkage evidence they have entered into database (whether attached to open diagram or not)

GENERAL NOTES, cont.

- Options
  - Preferred - all user-entered linkage evidence viewable by all registered users, even if diagrams they're attached to are private
    - Role definitions for further clarification by EPA: Do we distinguish who enters linkage evidence and/or creates diagrams (e.g., to track power-users)? Or do we just go with EPA vs. user community distinction, and make sure we caveat as appropriate?
  - Linkage evidence and diagram accessibility match – if diagram private, any linkage evidence attached to that diagram are private
  - User sets separate access settings for linkage evidence and diagrams

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-03

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☒ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 09/30/2012 To 09/29/2014	$37,731.00	328
This Action:	$20,948.00	196
Total:	$58,679.00	524

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated: 07/09/2014	$20,948.00	196
Cumulative Approved:	$58,679.00	524

Work Assignment Manager Name: Susan Norton (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8549 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) 08/14/14 (Date)	Branch/Mail Code: C POD Phone Number: 513-487-2351 FAX Number: 513-487-2109

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-04

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base Option Period Number 1	9th NWM Conference

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
09/30/2012 To 09/29/2014		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Alice Mayio (Signature) (Date)	Branch/Mail Code: Phone Number: 202-566-1184 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley Mark Cranley (Signature) 09/26/13 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109

Performance Work Statement
Tetra Tech, Inc
Contract EP-C-12-060
Work Assignment 1-04

TITLE: Support for the 9th National Water Monitoring Conference

PERIOD OF PERFORMANCE: September 30, 2013 through September 29, 2014

WORK ASSIGNMENT MANAGER:

Alice Mayio
Office of Water/Office of Wetlands, Oceans & Watersheds/Assessment and Watershed Protection Division/Monitoring Branch
1200 Pennsylvania Avenue NW (4503T), Washington, DC 20460
202-566-1184
mayio.alice@epa.gov

Alternate WAM:

Sarah Lehmann
Office of Water/Office of Wetlands, Oceans & Watersheds/Assessment and Watershed Protection Division/Monitoring Branch
1200 Pennsylvania Avenue NW (4503T), Washington, DC 20460
202-566-1379
Lehmann.sarah@epa.gov

INTRODUCTION

Among the main goals of the National Water Quality Monitoring Council (NWQMC) are to better integrate diverse monitoring efforts, use existing resources more effectively, and obtain consistent national monitoring resulting in comparable data and more consistent reporting. The activities of the NWQMC work toward improvements in status and trends assessment, assessment of human health and ecological risks due to environmental stressors, and water quality program design and evaluation. Among its many activities, the NWQMC sponsors a biennial National Water Quality Monitoring Conference that includes a varied agenda on topics such as assessing the impact of extreme events, addressing emerging contaminants and threats to human health and aquatic ecosystems, building and improving partnerships, and managing and sharing monitoring data. This task order provides technical support for the National Water Quality Monitoring Council and its work groups in convening the 9th National Monitoring Conference to be held in Cincinnati, Ohio between April 28 and May 2, 2014.

The contractor shall support to the NWQMC Conference Planning Committee (CPC), made up of approximately 30 volunteer representatives from federal, state, and local agencies, volunteer monitoring organizations, and the North American Lake Management Society. This CPC is

responsible for the primary activities of planning, organizing and implementing the Conference. Contractor support is needed to facilitate many of the tasks of the CPC.

OBJECTIVES

In response to this statement of work, the contractor shall carry out several tasks to provide support to the NWQMC Conference Planning Committee (CPC) for the 9th National Water Quality Monitoring Conference. These tasks include participating in conference planning calls, documenting planning decisions and meeting results, evaluating and organizing abstracts, communicating with accepted speakers and presenters, supporting the CPC in organizing sessions and workshops, developing the conference agenda, supporting the CPC in on-site conference logistics, and assembling presentations from accepted speakers.

This statement of work requests that the contractor shall perform the following activities:

Task 1. Prepare Work Plan and Cost Estimate, including Quality Assurance actions

The contractor shall prepare a work plan in response to this work assignment, outlining the proposed approach, expertise and staffing, and a schedule to complete each task. The work plan shall identify potential skills and tools needed and any potential problems that might be encountered during the execution of the work assignment. It is recommended that the contractor shall review the NWQMC conference website.

The contractor shall include a discussion of the Quality Control activities it will undertake to ensure that tasks under this work assignment are completed effectively, accurately, and in a timely fashion, and are well documented. All work shall be conducted in conformance with an approved Quality Management Plan. The contractor shall work with the WAM to ensure that quality standards are attained during the performance of these tasks. Any significant problems should be immediately brought to the attention of the WAM.

Task 1 – DELIVERABLES	
Deliverable	**Due Date**
Workplan, including QA activities and cost proposal	Within 20 days of receipt

Task 2. Participate in NWQMC conference planning calls

One contract staff shall participate in ongoing conference planning calls with the members of the Conference Planning Committee (CPC) as well as subgroup specialties of the CPC such as the Program Subcommittee during the period of contract award to May 2014. Approximately 18 calls are planned. This task is estimated at one (1) hour per call with an additional 2 hours per call allocated to follow-up issues that may arise, such as contacting members of other

subcommittees (such as the Local Planning Committee) or members who were absent from the call to answer questions raised during the main CPC call. No travel is expected for this task. Any technical direction resulting from these calls must come from the WAM .

Task 2 – DELIVERABLES	
Deliverable	**Due Date**
Conference calls with CPC	Dates and times to be determined by the CPC

Task 3. Support abstract selection, session organizing, and agenda development

The contractor shall support the CPC in the evaluation and selection of abstracts for presentation, workshops, and poster sessions, assist in the development of the conference agenda and agenda-at-a-glance, and communicate with accepted and rejected speakers, poster presenters, workshop organizers, and others. Any technical direction must come from the WAM.

3.1 One (1) contractor staff shall travel to and participate in the NWQMC Conference Planning Meeting Shepherdstown, WV for three days in November 2014 to facilitate conference planning discussions; assist the CPC in abstract evaluation, selection and session organizing; and document conference planning decisions made at the meeting. Other CPC members may not provide direction directly to the contractor. Any technical direction must come from the WAM.

3.2 The contractor shall provide support for the CPC in the final selection and grouping of approx. 350 abstracts, including replacement presentations; workshops; and approx. 120 poster presentations. Contractor shall provide additional support including contacting accepted presenters via email and telephone and confirming whether they accept/decline invitations to present and have registered for the conference, reminding moderators to plan their sessions and contact their speakers, responding to questions, tracking presenter and moderator scheduling requests, and communicating with session organizers to confirm session needs. The contractor shall work with the CPC to help identify alternates/replacements for those who cancel their attendance and develop a draft and final conference agenda. *NOTE: the contractor is not responsible for the development and/or printing of the conference program.* The contractor shall serve as key phone/email contact for any presenters who have questions about the conference.

Task 3 – DELIVERABLES	
Deliverable	**Due Date**
Support CPC at conference planning meeting in Shepherdstown, WV	On dates established by CPC (December 2014)
Provide documentation of conference planning decisions and draft session spreadsheet	Within 10-20 working days after conference planning meeting

Task 3 – DELIVERABLES	
Deliverable	**Due Date**
Provide CPC agenda development support , track presenter scheduling requests and serve as key contact with accepted speakers	Ongoing
Prepare final conference agenda	By April 10, 2014

Task 4. Provide logistical support at NWQMC conference and collect and develop Proceedings document suitable for web posting

4.1 Conference Logistics – The contractor shall provide one (1) staff member to attend the Ninth National Water Monitoring Conference to be held in Cincinnati, OH between April 28 and May 2, 2014 and assist the CPC with on-site registration and conference logistics. The contractor shall also work with presenters to be sure they submit presentations for conference proceedings. Any technical direction must come from the WAM.

4.2 Contractor shall collect and assemble Powerpoint presentations from speakers, including signed permission to post the presentations; develop PDF files of the presentations; and submit those electronically to the WAM as Conference Proceedings.

Task 4 – DELIVERABLES	
Deliverable	**Due**
Attend 9th National Water Monitoring Conference in Cincinnati, OH and provide logistical support to CPC	April 28 – May 2, 2014
Secure permissions to post presentations from conference speakers	By July 1, 2014
Assemble PPT presentations and develop PDF files for submission to WAM	August, 2014

Task 5. Monthly progress reports

The contractor shall manage the Work Assignment and submit monthly progress and financial reports. The monthly progress and financial reports shall be broken out by task. The monthly progress report shall include project status, expenditures to date, unexpected problems or concerns, lessons learned, QA/QC activities, and next steps. Conference calls shall occur bi-weekly to provide verbal status updates to the WAM, resolve uncertainties or correct problems that may occur.

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Task 5 – DELIVERABLES	
Deliverable	**Due**
Progress and financial reports, including QA report	Monthly
Calls with EPA	Bi-weekly
Notification of significant problems	Immediately when encountered

ACCEPTANCE CRITERIA:

The contractor shall perform tasks in a timely and complete manner, following accepted QA steps. Summaries of calls and any other materials developed under this WA shall be complete and presented in a logical, readable manner and shall be provided in Microsoft Word 2007 or as pdf documents, as relevant. The WAM will review call summaries, monthly progress reports, and final deliverables to ensure quality and comprehensiveness.

CONFLICT OF INTEREST:

The Contractor warrants that, to the best of the Contractor's knowledge and belief, that there are no relevant facts or circumstances which could give rise to a conflict of interest, as defined in FAR subpart 9.5, or that the Contractor has disclosed all such relevant information.

The Contractor agrees to notify the Contracting Officer immediately, that to the best of its knowledge and belief, no actual or potential conflict of interest exists or to identify to the Contracting Officer any actual or potential conflict of interest the Contractor may have.

The Contractor agrees that if an actual or potential conflict of interest is identified during the performance, the Contractor shall immediately make a full disclosure in writing to the Contracting Officer. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consulting with the Contracting Officer, to avoid, mitigate, or neutralize the actual or potential conflict of interest. The Contractor shall continue performance until notified by the Contracting Officer of any contrary action to be taken.

MANAGEMENT CONTROLS:

1. The EPA will review and provide comments on the Work Plan and QAPP.

2. The Contractor shall clearly identify itself as an EPA contractor when acting in fulfillment of this contract. No decision-making activities relating to Agency policy, enforcement or future contracting shall take place if the Contractor is present. If the Contractor has a need to meet with Federal employees on-site, then the Contractor

personnel shall visibly wear identification in performance of this contract while on-site that will be issued by the Government upon arrival to the Federal facility.

3. Technical Direction: The WAM is authorized to provide technical direction that clarifies the statement of work as set forth in this work assignment. Before initiating any action under technical direction, the contractor shall ensure that the technical direction falls within the scope of work for this work assignment. The technical direction shall be issued in writing by the WAM within four working days of verbal issuance. This will be forwarded to the PO and CO for their information and necessary actions.

   The WAM/COR is the only person authorized to make changes to this work assignment or contract. The changes must have prior approval from the WAM/COR in writing as an amendment or modification to the work assignment or contract.

   Technical direction includes direction to the contractor that assists the contractor in accomplishing individual tasks deemed appropriate under the Statement of Work, as well as comments and approval of reports and other deliverables

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-04

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-060	09/30/2012 To 09/29/2014 Base X Option Period Number	9th NWM Conference

Contractor: TETRA TECH, INC.

Specify Section and paragraph of Contract SOW:

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [X] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 09/30/2013 To 09/29/2014

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (Max 2):

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 09/30/2012 To 09/29/2014	$0.00	0
This Action:	$52,985.00	560
Total:	$52,985.00	560

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated: 11/06/2913	$52,985.00	560
Cumulative Approved:	$52,985.00	560

Work Assignment Manager Name: Alice Mayio (Signature) (Date)	Branch/Mail Code: Phone Number: 202-566-1184 FAX Number:
Project Officer Name: Sharon Boyde (Signature) (Date)	Branch/Mail Code: Phone Number: 703-347-8576 FAX Number: 703-374-8696
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Mark Cranley (Signature) 12/17/2013 (Date)	Branch/Mail Code: CPOD Phone Number: 513-487-2351 FAX Number: 513-487-2109